This Page Is Inserted by IFW Operations
and is not a part of the Official Record

# BEST AVAILABLE IMAGES

Defective images within this document are accurate representations of the original documents submitted by the applicant.

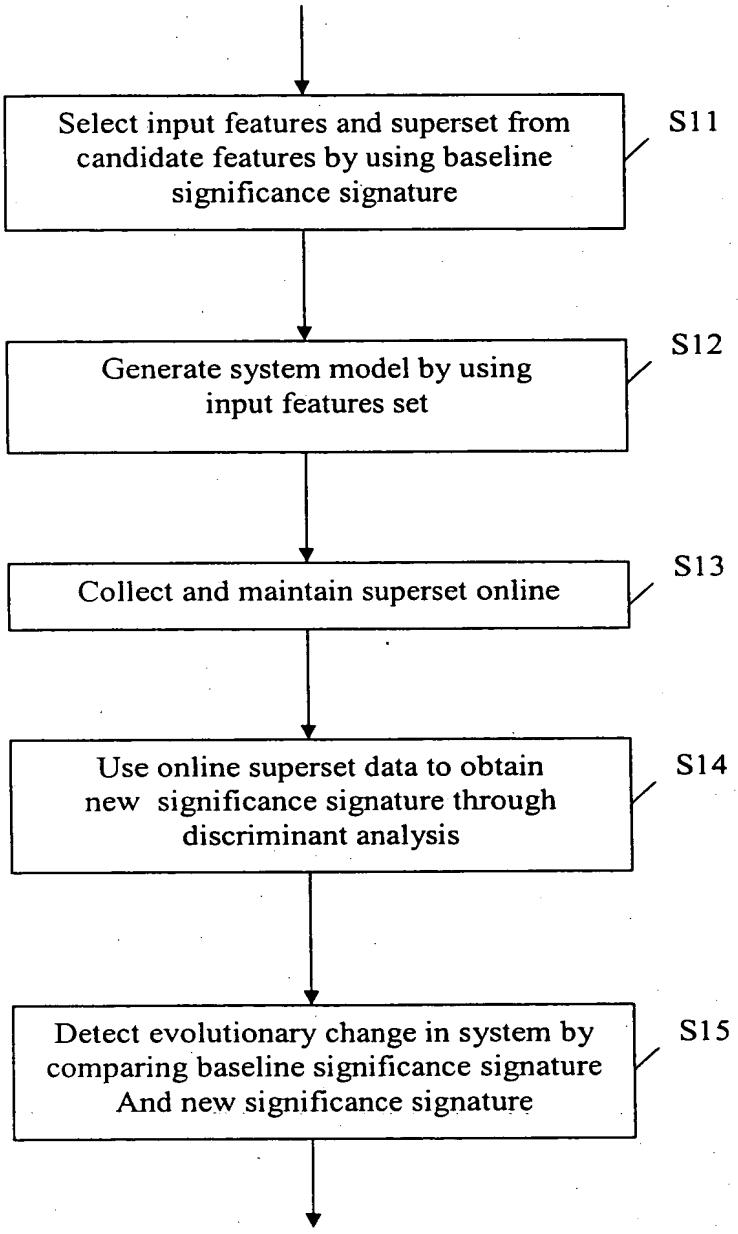
Defects in the images may include (but are not limited to):

- BLACK BORDERS
- TEXT CUT OFF AT TOP, BOTTOM OR SIDES
- FADED TEXT
- ILLEGIBLE TEXT
- SKEWED/SLANTED IMAGES
- COLORED PHOTOS
- BLACK OR VERY BLACK AND WHITE DARK PHOTOS
- GRAY SCALE DOCUMENTS

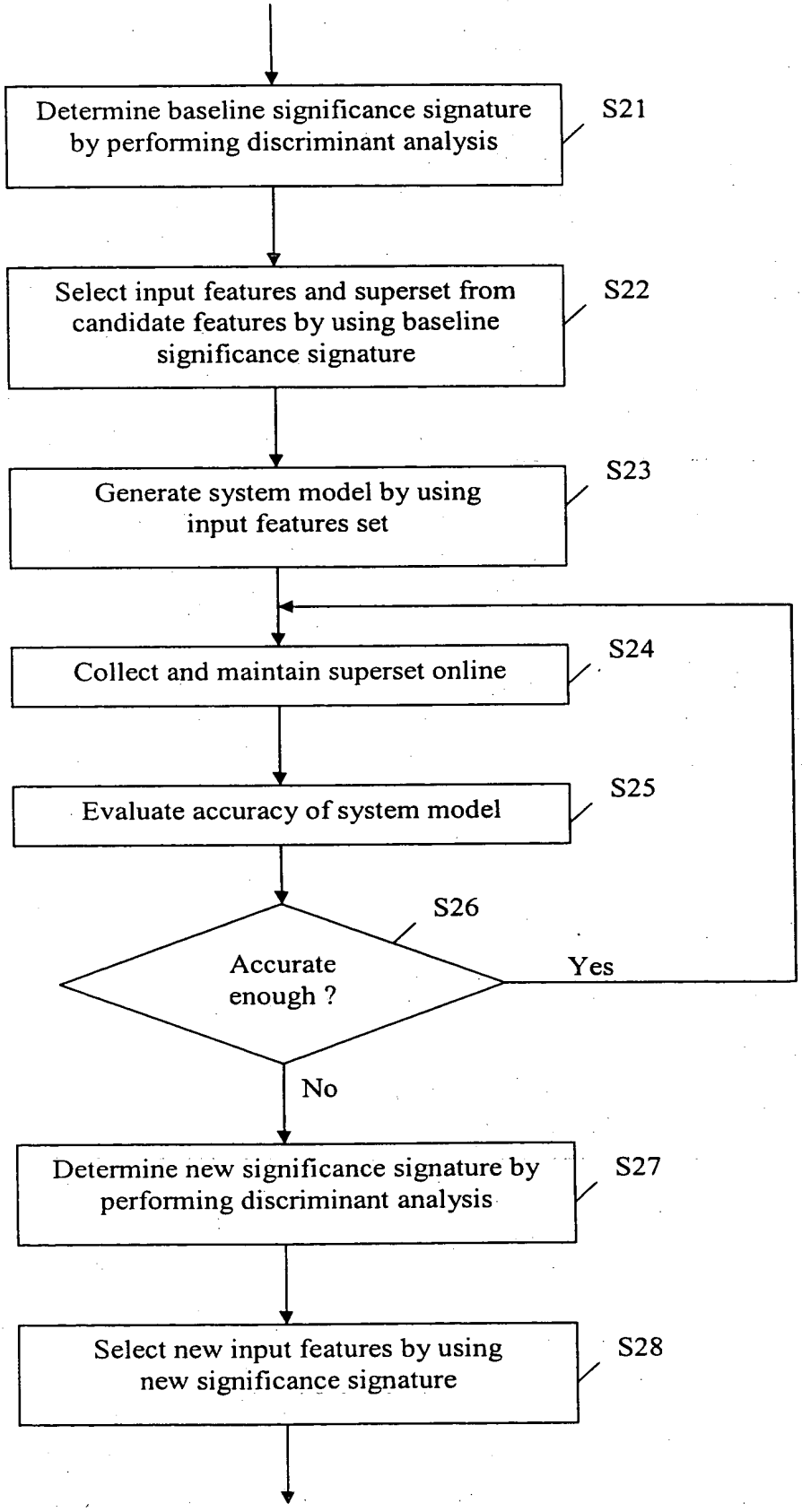
## IMAGES ARE BEST AVAILABLE COPY.

**As rescanning documents *will not* correct images, please do not report the images to the Image Problem Mailbox.**

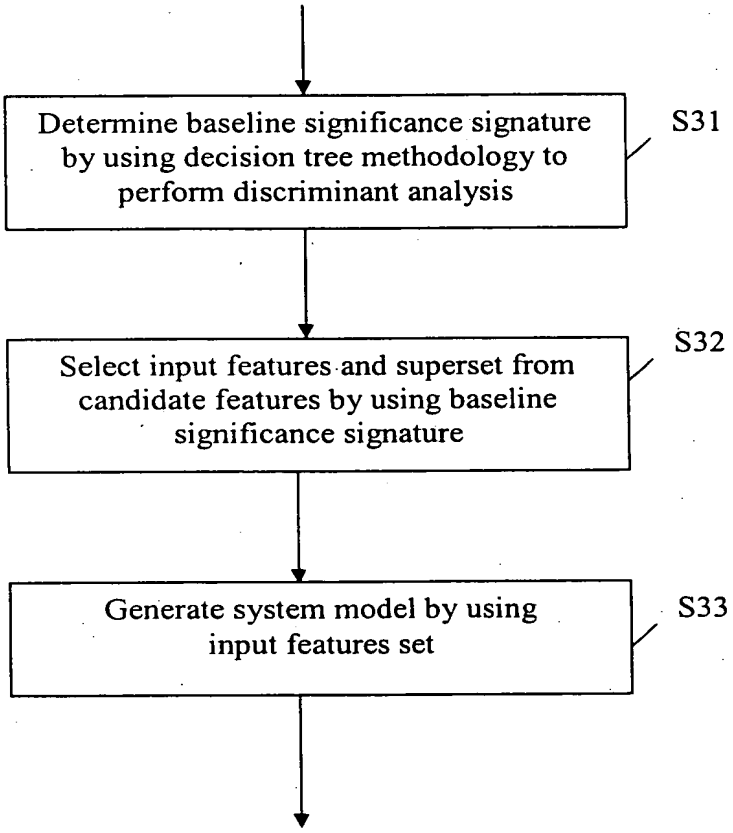
# FIG. 1


Select input features and superset from candidate features by using baseline significance signature
S11
Generate system model by using input features set
S12
Collect and maintain superset online
S13
Use online superset data to obtain new significance signature through discriminant analysis
S14
Detect evolutionary change in system by comparing baseline significance signature And new significance signature
S15

# FIG. 2


Determine baseline significance signature by performing discriminant analysis
S21
Select input features and superset from candidate features by using baseline significance signature
S22
Generate system model by using input features set
S23
Collect and maintain superset online
S24
Evaluate accuracy of system model
S25
Accurate enough ?
S26
Yes
No
Determine new significance signature by performing discriminant analysis
S27
Select new input features by using new significance signature
S28

# FIG. 3


Determine baseline significance signature by using decision tree methodology to perform discriminant analysis
S31
Select input features and superset from candidate features by using baseline significance signature
S32
Generate system model by using input features set
S33

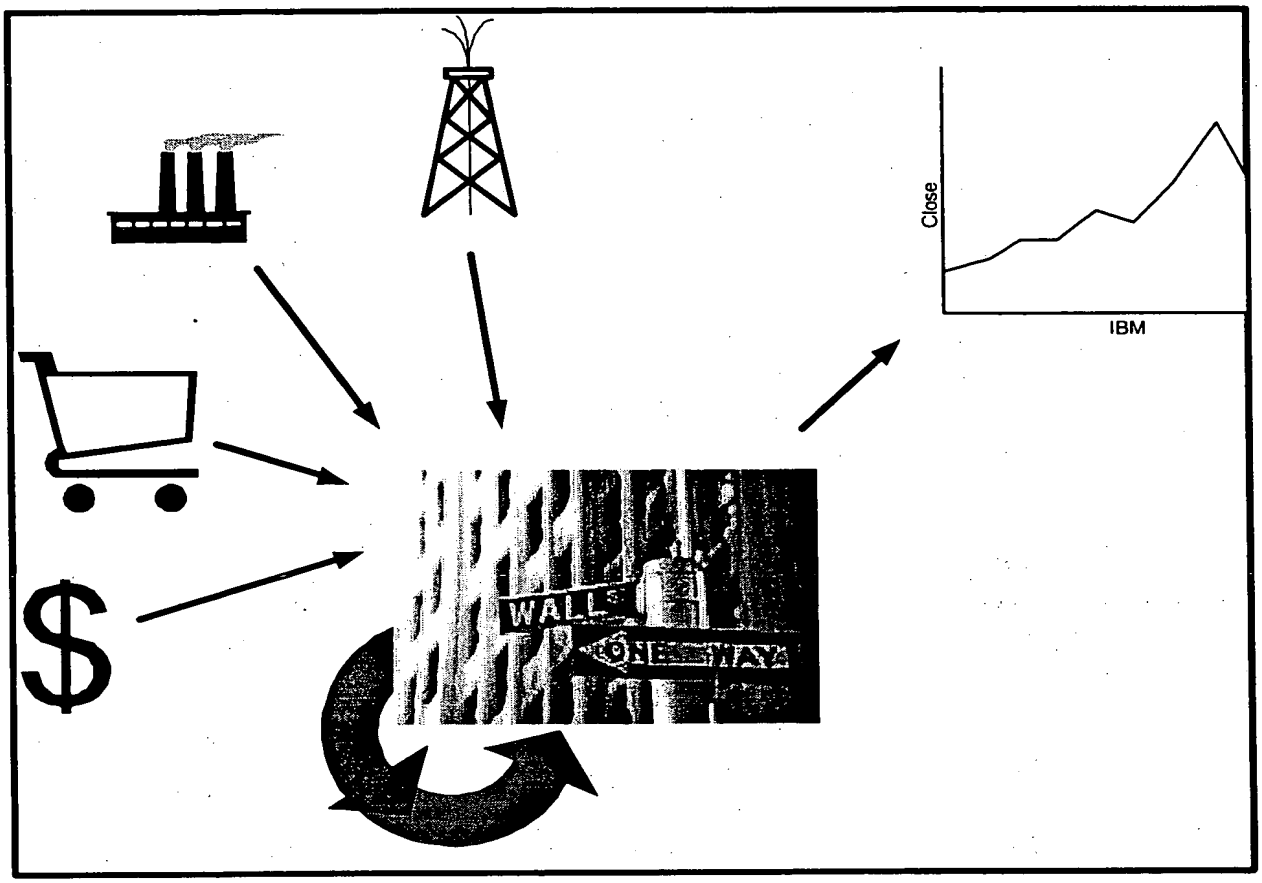



FIG. 4

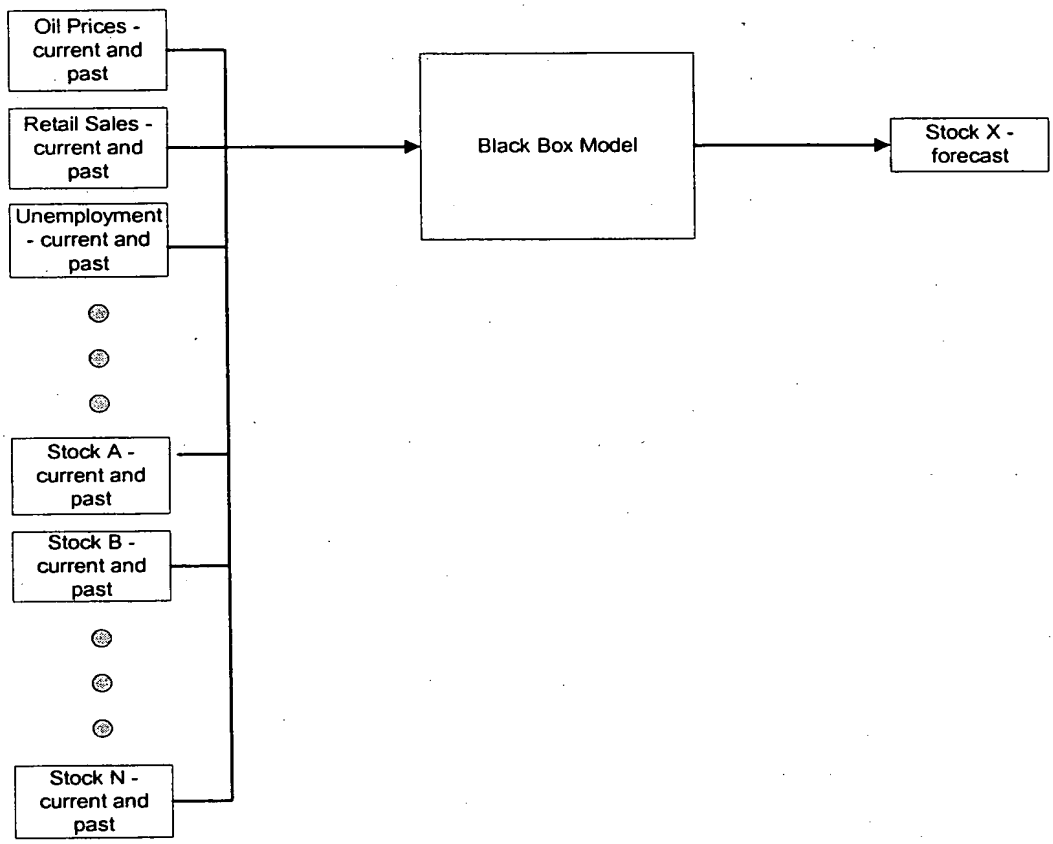

Oil Prices - current and past
Retail Sales - current and past
Unemployment - current and past
Stock A - current and past
Stock B - current and past
Stock N - current and past
Black Box Model
Stock X - forecast

FIG. 5

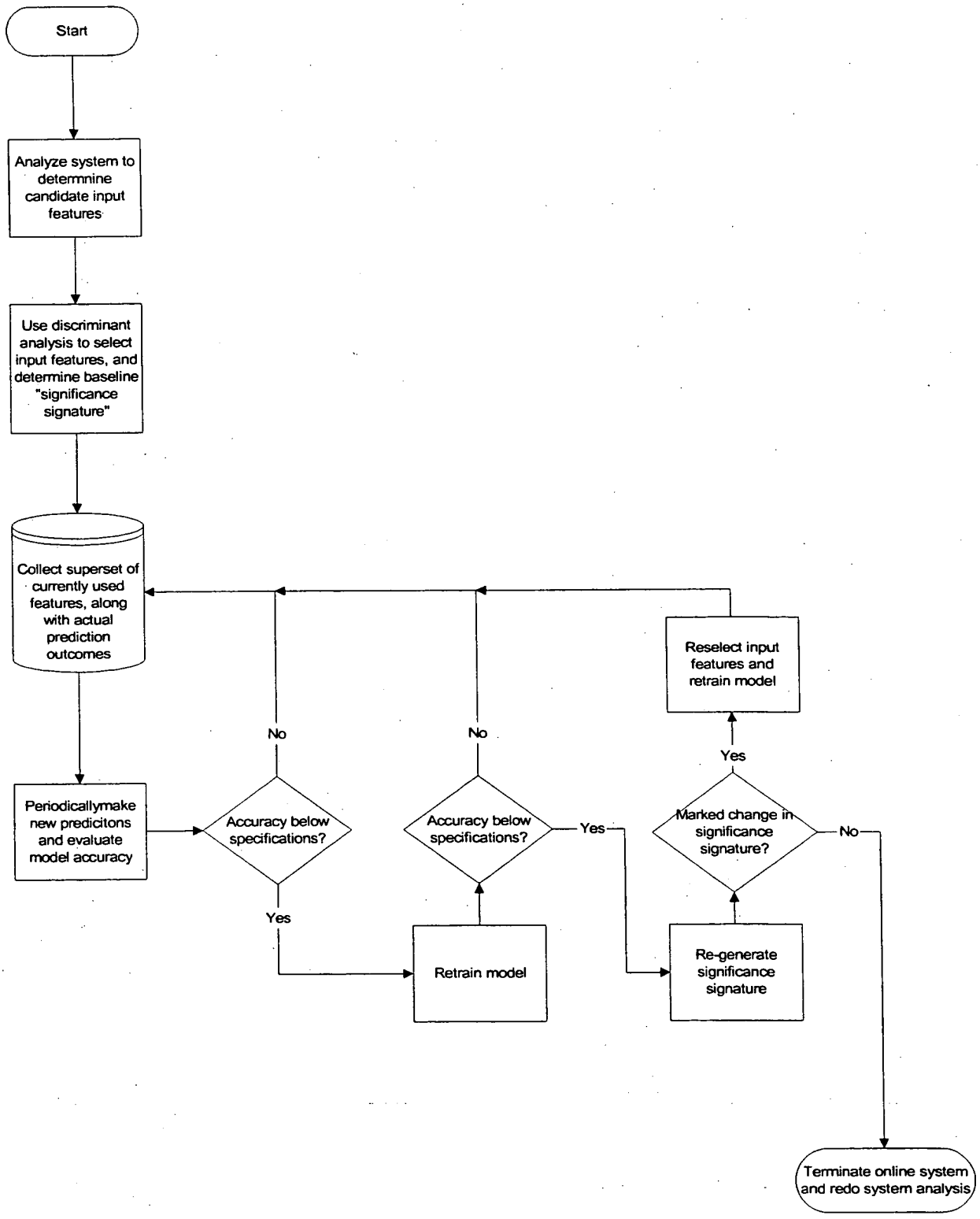
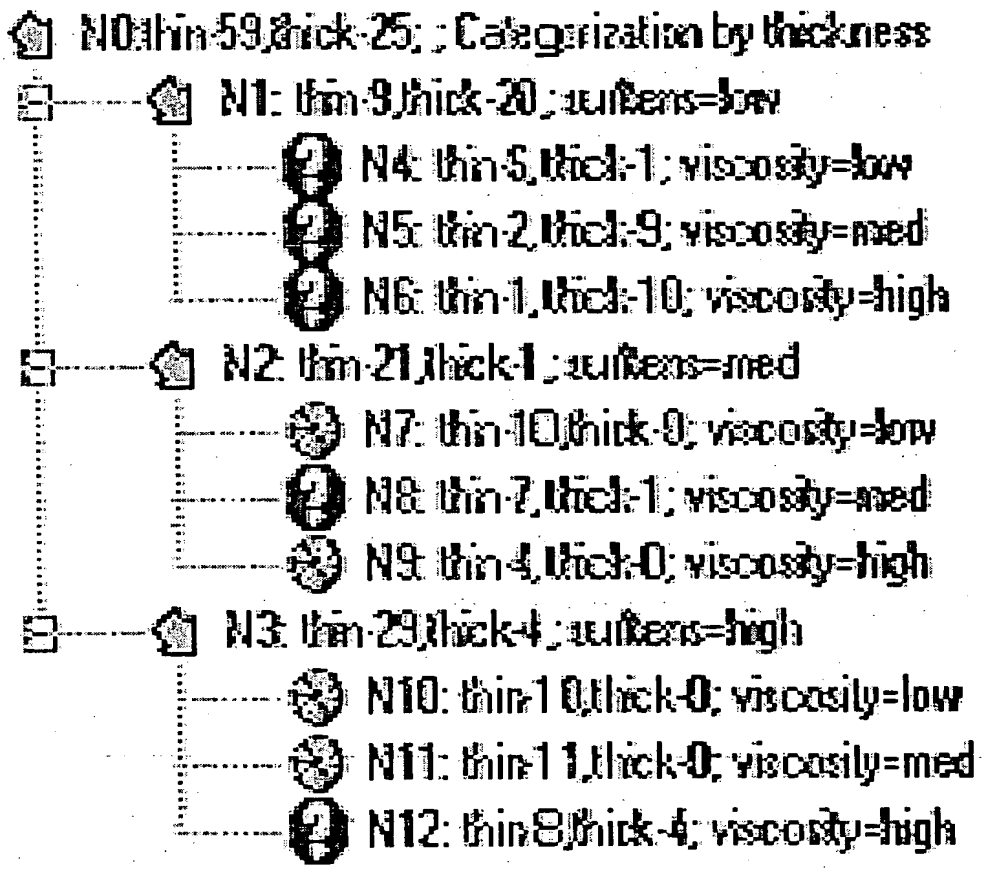
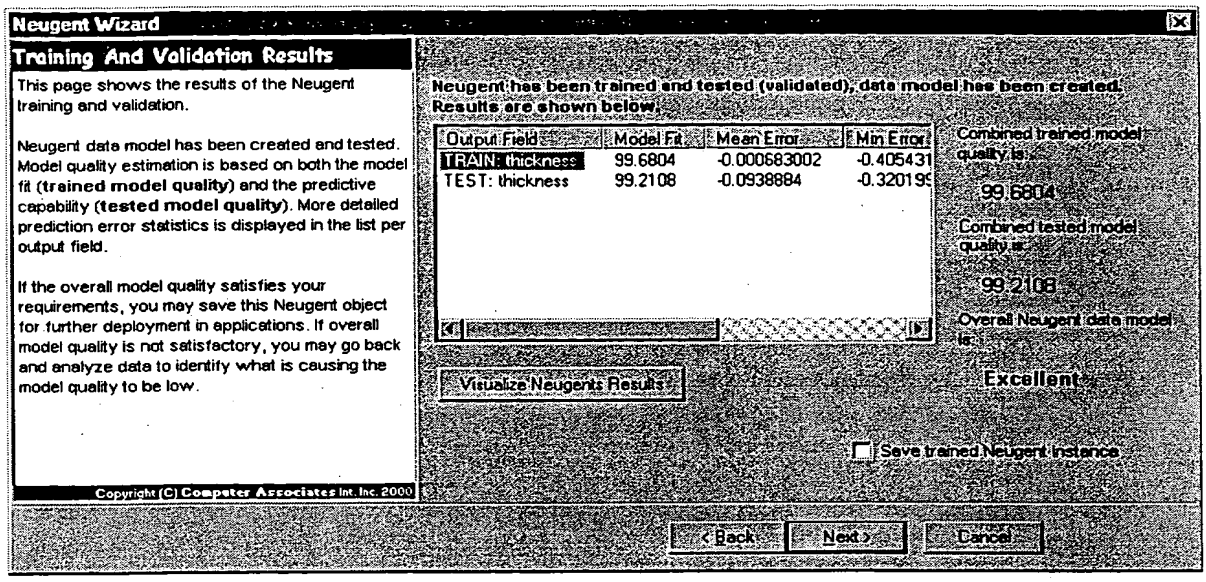

Start
Analyze system to determnine candidate input features
Use discriminant analysis to select input features, and determine baseline "significance signature"
Collect superset of currently used features, along with actual prediction outcomes
Periodicallymake new predicitons and evaluate model accuracy
Accuracy below specifications?
No
Yes
Retrain model
Accuracy below specifications?
No
Yes
Marked change in significance signature?
Yes
No
Reselect input features and retrain model
Re-generate significance signature
Terminate online system and redo system analysis

FIG. 6

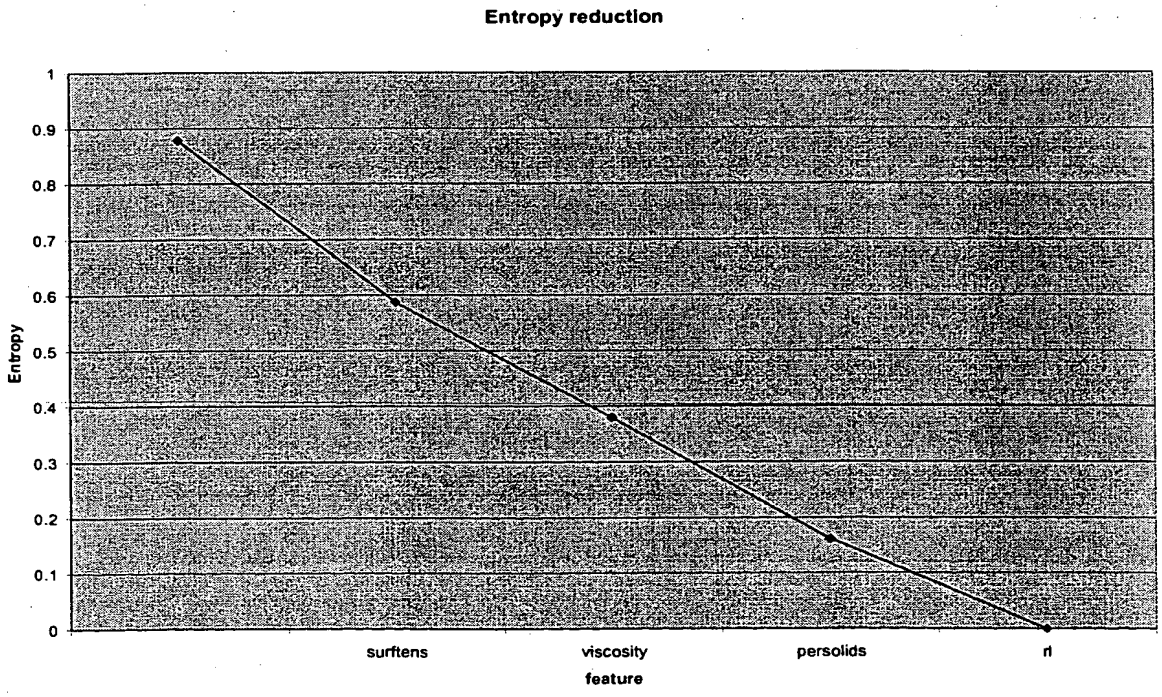
# FIG. 7


N0:thin-59,thick-25; ; Categorization by thickness
N1: thin-9,thick-20 ; surfbens=low
N4: thin-5,thick:-1 ; viscosity=low
N5: thin-2,thick:-9; viscosity=med
N6: thin-1,thick:-10; viscosity=high
N2: thin-21,thick-1 ; surfbens=med
N7: thin-10,thick-0; viscosity=low
N8: thin-7,thick:-1 ; viscosity=med
N9: thin-4,thick:-0; viscosity=high
N3: thin-29,thick-4 ; surfbens=high
N10: thin-10,thick-0; viscosity=low
N11: thin-11,thick-0; viscosity=med
N12: thin-8,thick-4; viscosity=high

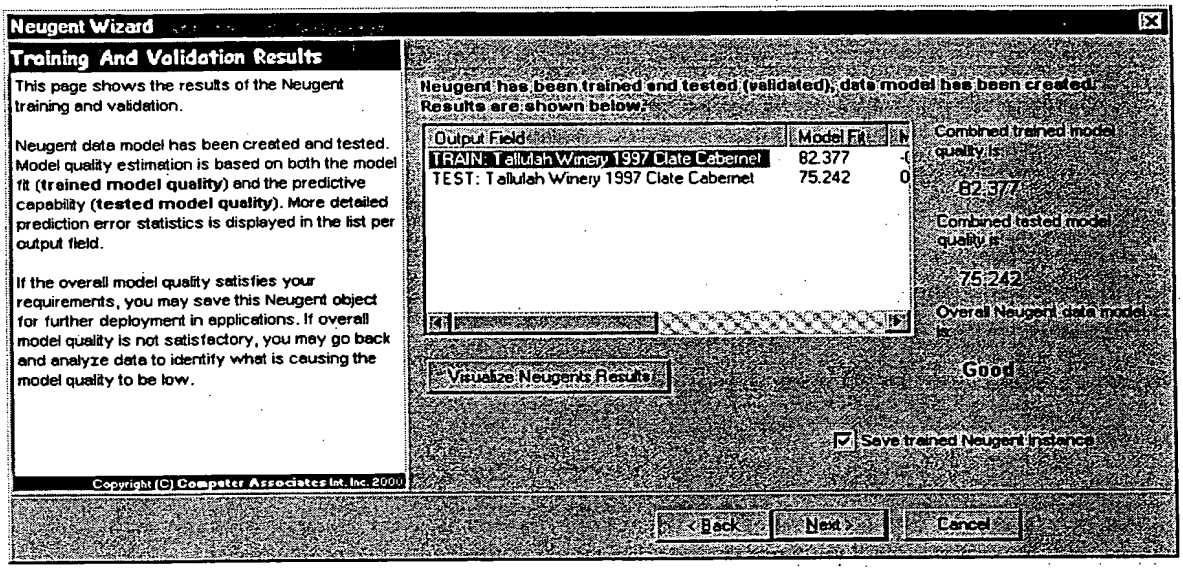
# FIG. 8


Neugent Wizard
Training And Validation Results
This page shows the results of the Neugent training and validation.
Neugent data model has been created and tested. Model quality estimation is based on both the model fit (trained model quality) and the predictive capability (tested model quality). More detailed prediction error statistics is displayed in the list per output field.
If the overall model quality satisfies your requirements, you may save this Neugent object for further deployment in applications. If overall model quality is not satisfactory, you may go back and analyze data to identify what is causing the model quality to be low.
Copyright (C) Computer Associates Int. Inc. 2000
Neugent has been trained and tested (validated), data model has been created. Results are shown below.
Output Field
Model Fit
Mean Error
Min Error
TRAIN: thickness
99.6804
-0.000683002
-0.405431
TEST: thickness
99.2108
-0.0938884
-0.320195
Combined trained model quality is:
99.6804
Combined tested model quality is:
99.2108
Overall Neugent data model is:
Excellent
Visualize Neugents Results
Save trained Neugent instance
< Back
Next >
Cancel

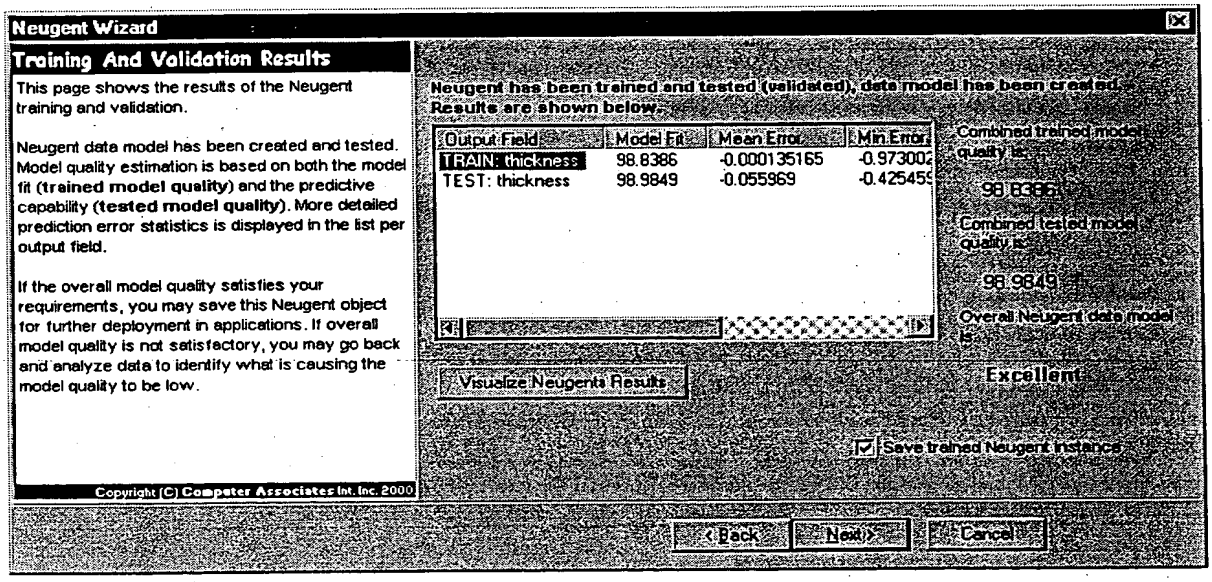
# FIG. 9


Entropy reduction
Entropy
1
0.9
0.8
0.7
0.6
0.5
0.4
0.3
0.2
0.1
0
surftens
viscosity
persolids
rl
feature

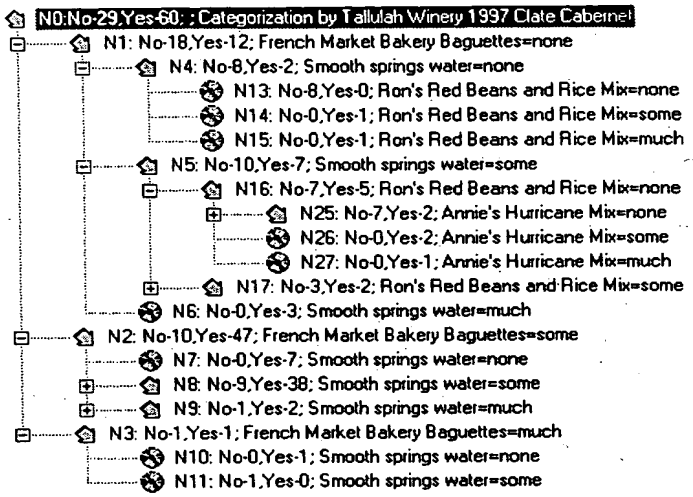
# FIG. 10


Neugent Wizard
Training And Validation Results
This page shows the results of the Neugent training and validation.
Neugent data model has been created and tested. Model quality estimation is based on both the model fit (trained model quality) and the predictive capability (tested model quality). More detailed prediction error statistics is displayed in the list per output field.
If the overall model quality satisfies your requirements, you may save this Neugent object for further deployment in applications. If overall model quality is not satisfactory, you may go back and analyze data to identify what is causing the model quality to be low.
Copyright (C) Computer Associates Int. Inc. 2000
Neugent has been trained and tested (validated), data model has been created. Results are shown below:
Output Field
Model Fit
TRAIN: Tallulah Winery 1997 Clate Cabernet
82.377
TEST: Tallulah Winery 1997 Clate Cabernet
75.242
Combined trained model quality is:
82.377
Combined tested model quality is:
75.242
Overall Neugent data model is:
Good
Visualize Neugents Results
Save trained Neugent instance
< Back
Next >
Cancel

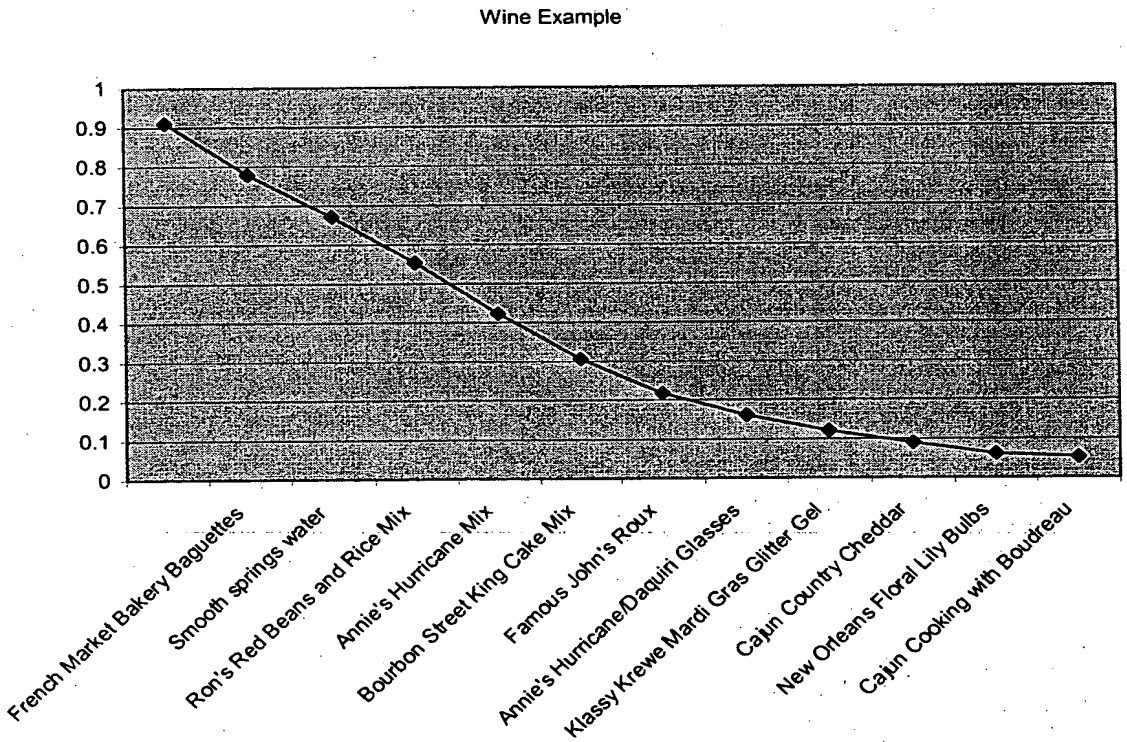
# FIG. 11


Neugent Wizard
Training And Validation Results
This page shows the results of the Neugent training and validation.
Neugent data model has been created and tested. Model quality estimation is based on both the model fit (trained model quality) and the predictive capability (tested model quality). More detailed prediction error statistics is displayed in the list per output field.
If the overall model quality satisfies your requirements, you may save this Neugent object for further deployment in applications. If overall model quality is not satisfactory, you may go back and analyze data to identify what is causing the model quality to be low.
Copyright (C) Computer Associates Int. Inc. 2000
Neugent has been trained and tested (validated), data model has been created. Results are shown below:
Output Field
Model Fit
Mean Error
Min Error
TRAIN: thickness
98.8386
-0.000135165
TEST: thickness
98.9849
-0.055969
Combined trained model quality is:
98.8386
Combined tested model quality is:
98.9849
Overall Neugent data model is:
Excellent
Visualize Neugents Results
Save trained Neugent instance
< Back
Next >
Cancel

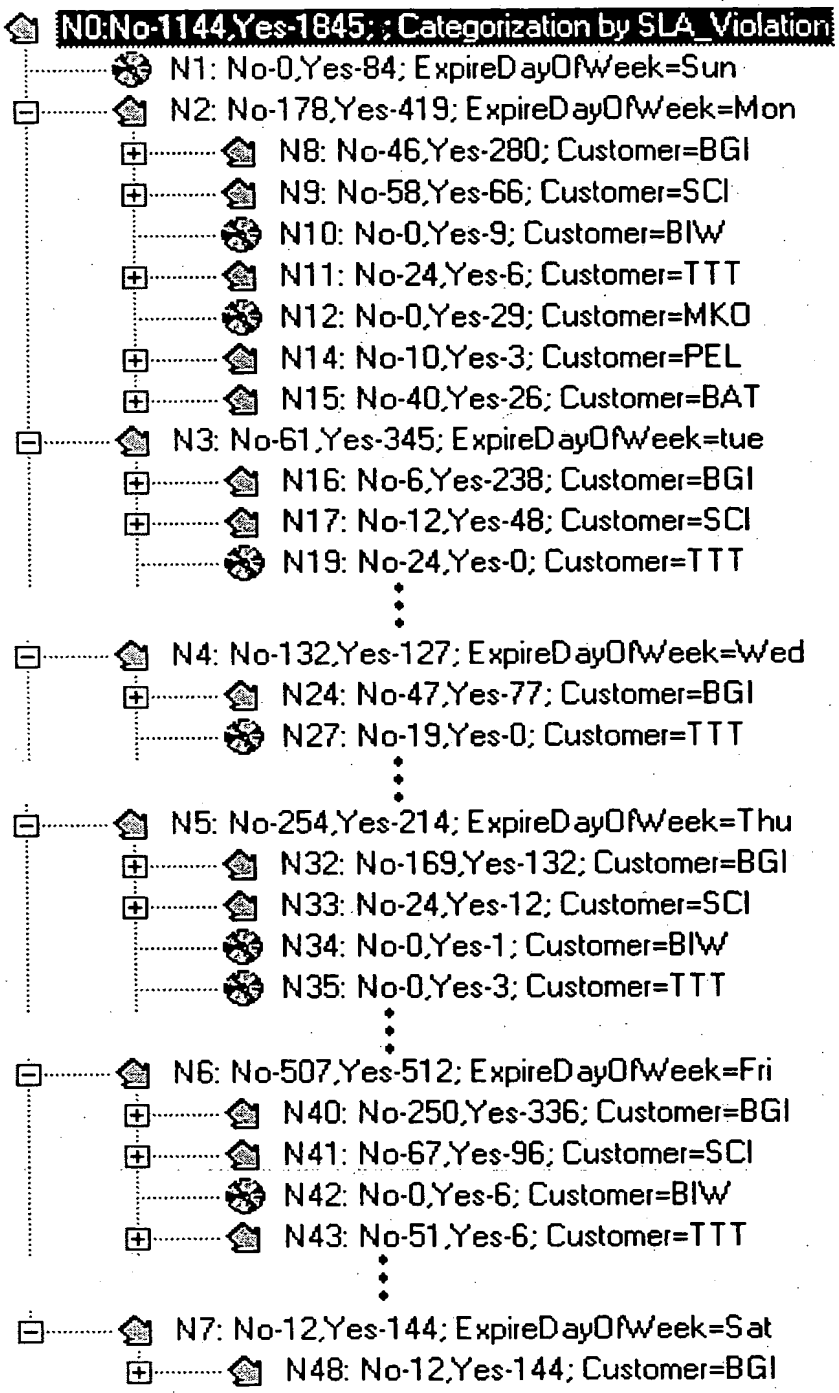
# FIG. 12


N0:No-29,Yes-60; ; Categorization by Tallulah Winery 1997 Clate Cabernet
N1: No-18,Yes-12; French Market Bakery Baguettes=none
N4: No-8,Yes-2; Smooth springs water=none
N13: No-8,Yes-0; Ron's Red Beans and Rice Mix=none
N14: No-0,Yes-1; Ron's Red Beans and Rice Mix=some
N15: No-0,Yes-1; Ron's Red Beans and Rice Mix=much
N5: No-10,Yes-7; Smooth springs water=some
N16: No-7,Yes-5; Ron's Red Beans and Rice Mix=none
N25: No-7,Yes-2; Annie's Hurricane Mix=none
N26: No-0,Yes-2; Annie's Hurricane Mix=some
N27: No-0,Yes-1; Annie's Hurricane Mix=much
N17: No-3,Yes-2; Ron's Red Beans and Rice Mix=some
N6: No-0,Yes-3; Smooth springs water=much
N2: No-10,Yes-47; French Market Bakery Baguettes=some
N7: No-0,Yes-7; Smooth springs water=none
N8: No-9,Yes-38; Smooth springs water=some
N9: No-1,Yes-2; Smooth springs water=much
N3: No-1,Yes-1; French Market Bakery Baguettes=much
N10: No-0,Yes-1; Smooth springs water=none
N11: No-1,Yes-0; Smooth springs water=some

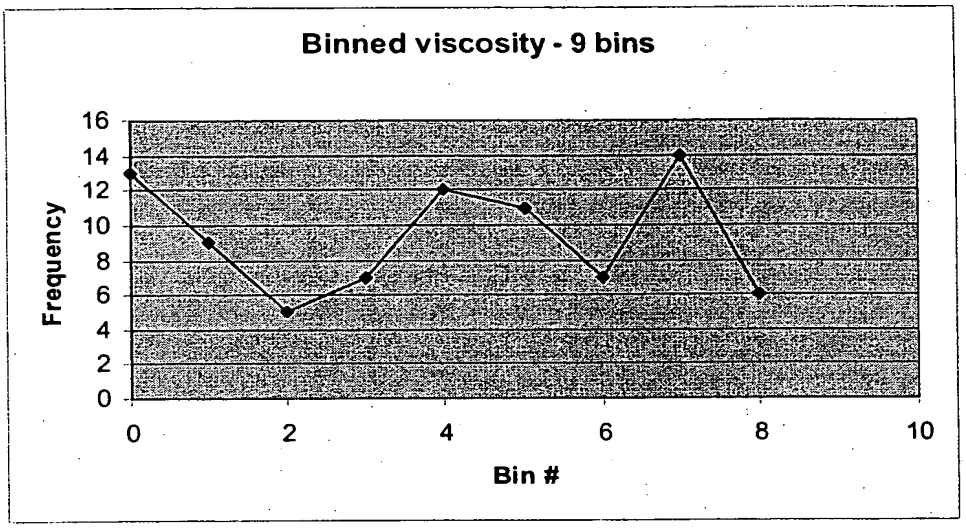
# FIG. 13


Wine Example
1
0.9
0.8
0.7
0.6
0.5
0.4
0.3
0.2
0.1
0
French Market Bakery Baguettes
Smooth springs water
Ron's Red Beans and Rice Mix
Annie's Hurricane Mix
Bourbon Street King Cake Mix
Famous John's Roux
Annie's Hurricane/Daquiri Glasses
Klassy Krewe Mardi Gras Glitter Gel
Cajun Country Cheddar
New Orleans Floral Lily Bulbs
Cajun Cooking with Boudreau

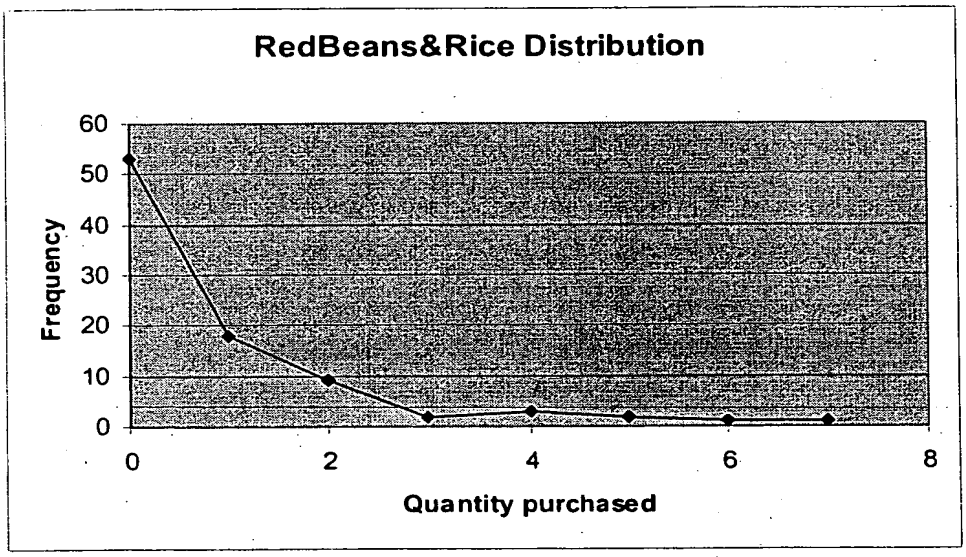
# FIG 14


N0:No-1144,Yes-1845; ; Categorization by SLA_Violation
N1: No-0,Yes-84; ExpireDayOfWeek=Sun
N2: No-178,Yes-419; ExpireDayOfWeek=Mon
N8: No-46,Yes-280; Customer=BGI
N9: No-58,Yes-66; Customer=SCI
N10: No-0,Yes-9; Customer=BIW
N11: No-24,Yes-6; Customer=TTT
N12: No-0,Yes-29; Customer=MKO
N14: No-10,Yes-3; Customer=PEL
N15: No-40,Yes-26; Customer=BAT
N3: No-61,Yes-345; ExpireDayOfWeek=tue
N16: No-6,Yes-238; Customer=BGI
N17: No-12,Yes-48; Customer=SCI
N19: No-24,Yes-0; Customer=TTT
N4: No-132,Yes-127; ExpireDayOfWeek=Wed
N24: No-47,Yes-77; Customer=BGI
N27: No-19,Yes-0; Customer=TTT
N5: No-254,Yes-214; ExpireDayOfWeek=Thu
N32: No-169,Yes-132; Customer=BGI
N33: No-24,Yes-12; Customer=SCI
N34: No-0,Yes-1; Customer=BIW
N35: No-0,Yes-3; Customer=TTT
N6: No-507,Yes-512; ExpireDayOfWeek=Fri
N40: No-250,Yes-336; Customer=BGI
N41: No-67,Yes-96; Customer=SCI
N42: No-0,Yes-6; Customer=BIW
N43: No-51,Yes-6; Customer=TTT
N7: No-12,Yes-144; ExpireDayOfWeek=Sat
N48: No-12,Yes-144; Customer=BGI

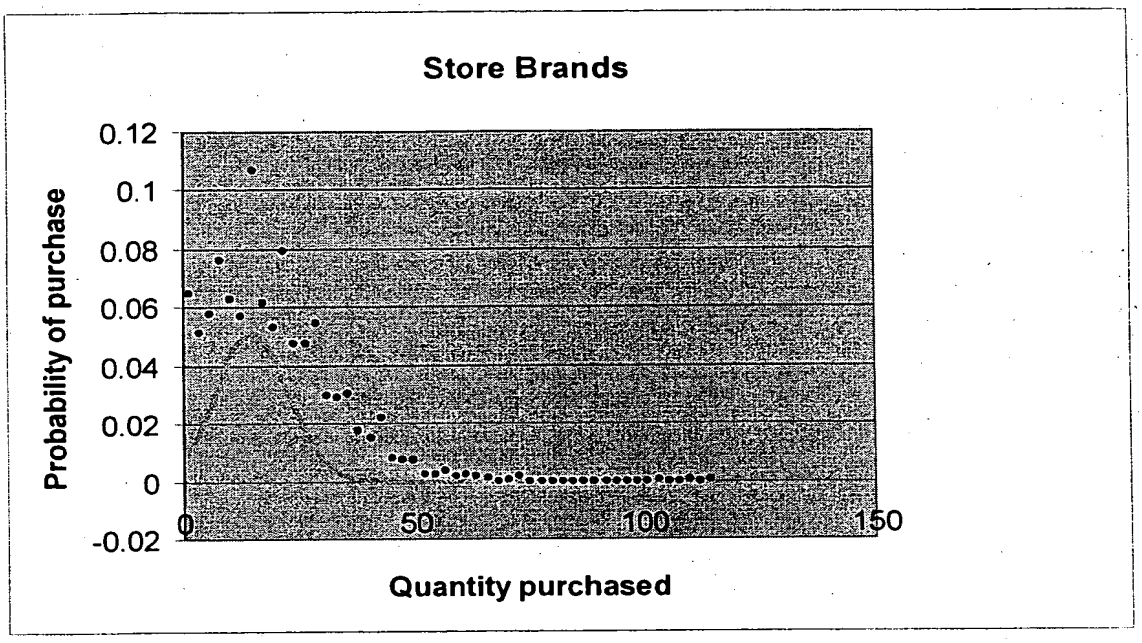
# FIG. 15


Binned viscosity - 9 bins
Frequency
16
14
12
10
8
6
4
2
0
0
2
4
6
8
10
Bin #

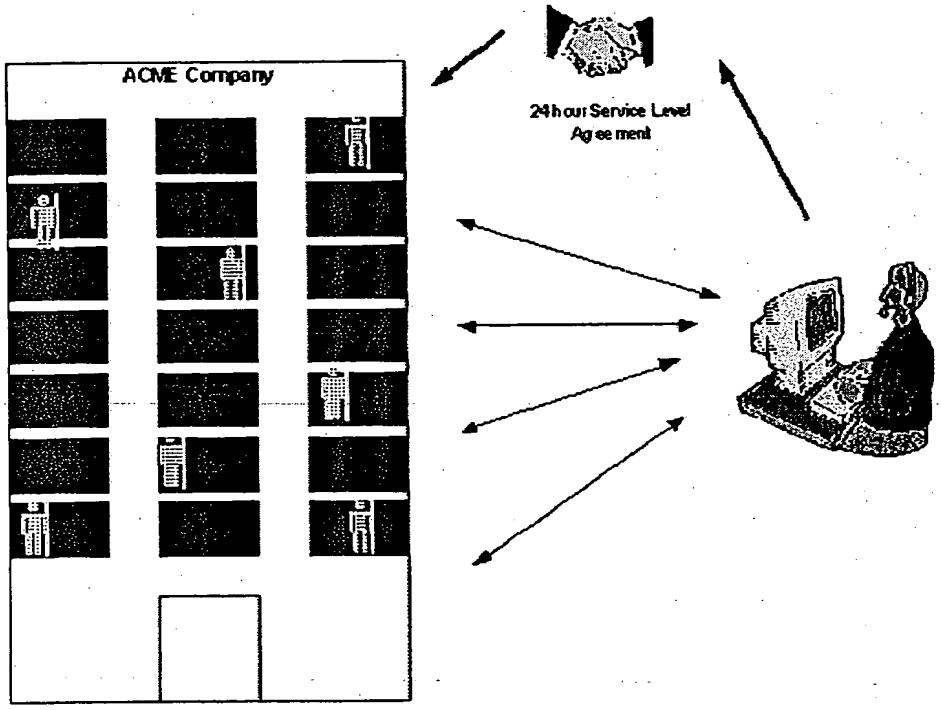
# FIG. 16


RedBeans&Rice Distribution
Frequency
60
50
40
30
20
10
0
0
2
4
6
8
Quantity purchased

# FIG. 17


Store Brands
Probability of purchase
0.12
0.1
0.08
0.06
0.04
0.02
0
-0.02
0
50
100
150
Quantity purchased

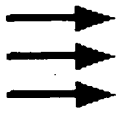
# FIG. 18


ACME Company
24 hour Service Level Agreement

# FIG. 19

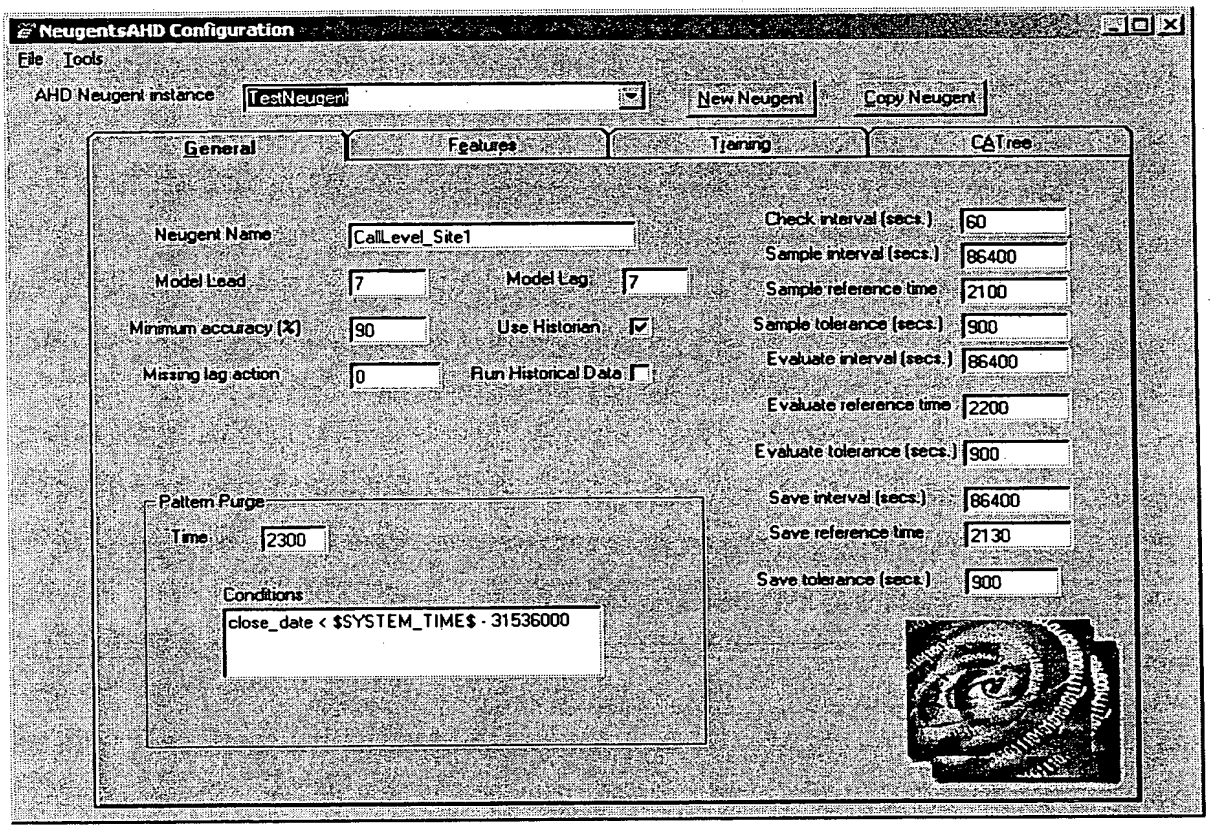
## Problem Codes influencing SLAs

| Last Week | |
|---|---|
| 1 | Network |
| 2 | PC |
| 3 | Mainframe |
| 4 | Password |
| 5 | Word Processing |
| 6 | Spreadsheet |
| 7 | Dial-up |
| 8 | Hardware |
| 9 | Email |
| 10 | Software Upgrade |

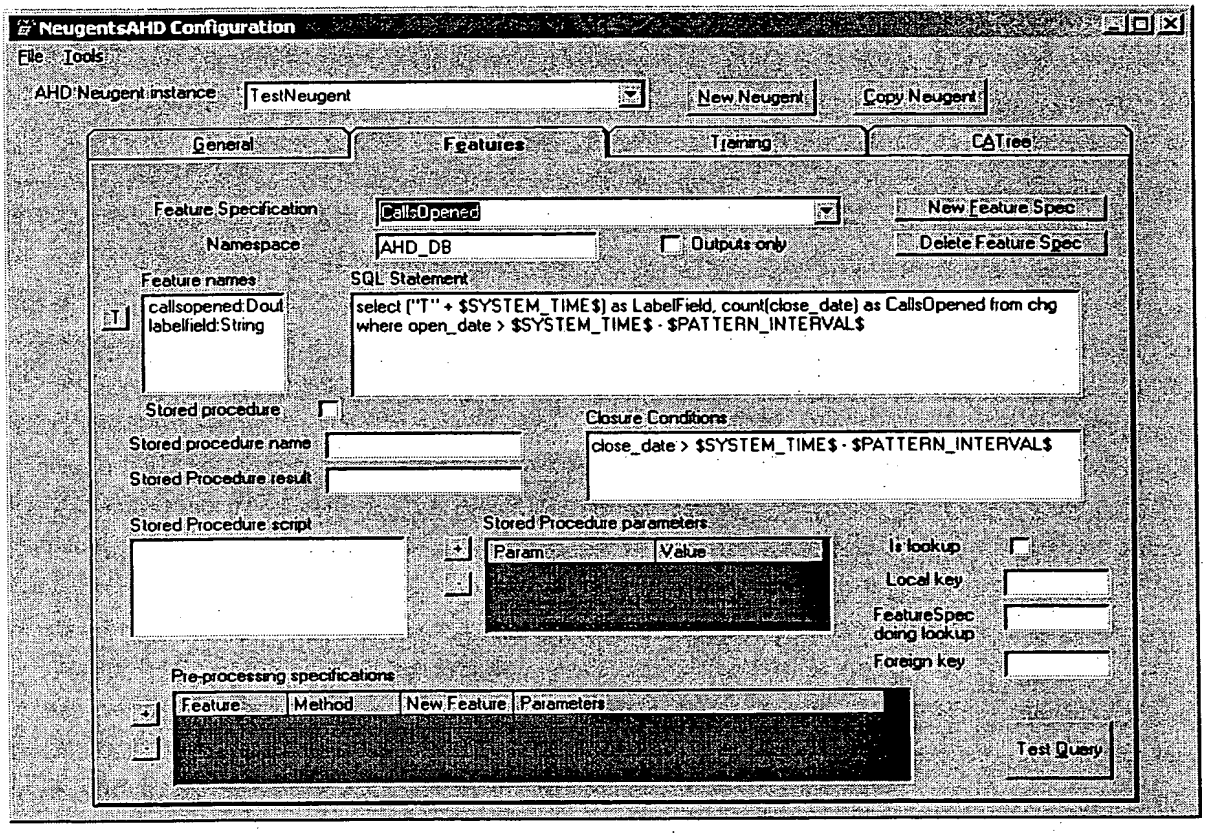


| This Week | |
|---|---|
| 1 | PC |
| 2 | Network |
| 3 | Printer |
| 4 | Software Upgrade |
| 5 | Password |
| 6 | Dial-up |
| 7 | Spreadsheet |
| 8 | Hardware |
| 9 | Email |
| 10 | Word Processing |

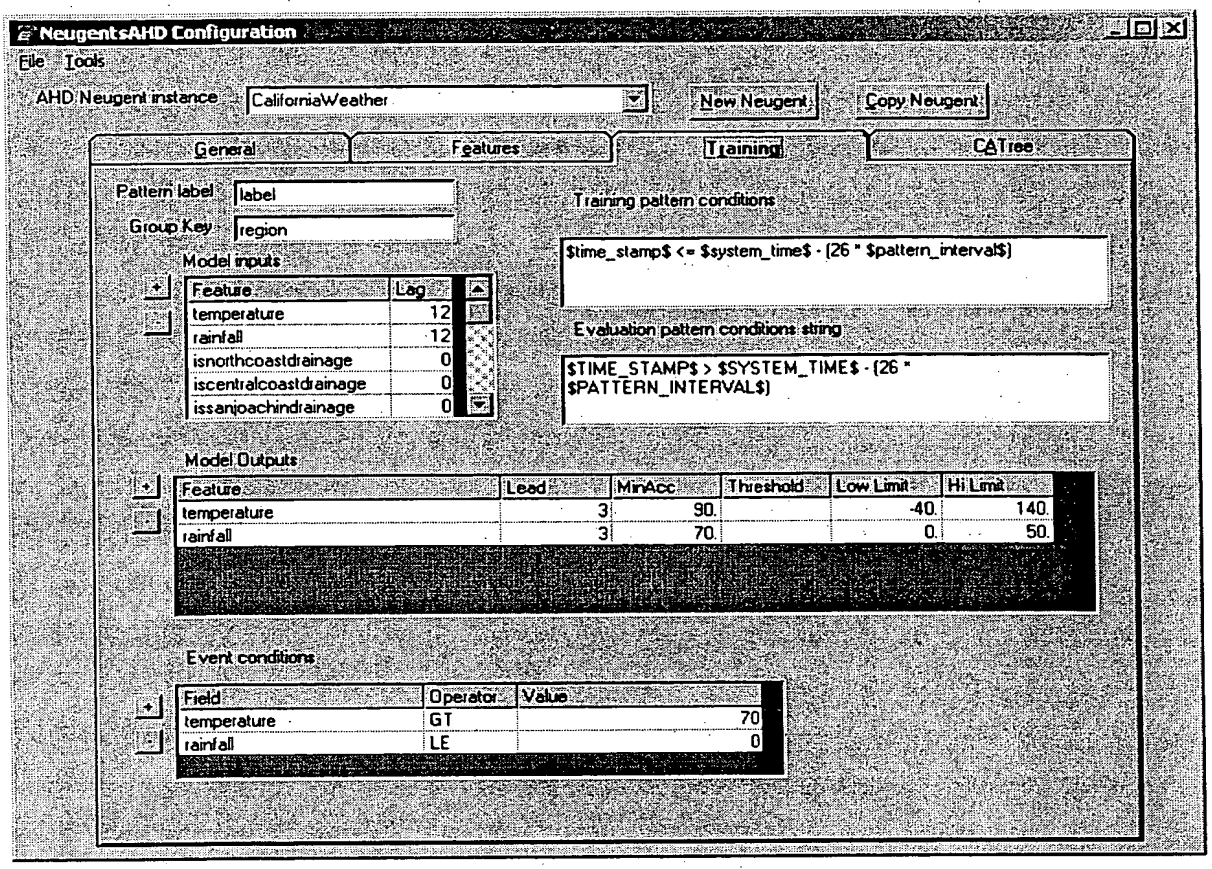
# FIG. 20


NeugentsAHD Configuration
File
Tools
AHD Neugent instance
TestNeugent
New Neugent
Copy Neugent
General
Features
Training
CATree
Neugent Name
CallLevel_Site1
Model Lead
7
Model Lag
7
Minimum accuracy (%)
90
Use Historian
Missing lag action
0
Run Historical Data
Pattern Purge
Time
2300
Conditions
close_date < $SYSTEM_TIME$ - 31536000
Check interval (secs.)
60
Sample interval (secs.)
86400
Sample reference time
2100
Sample tolerance (secs.)
900
Evaluate interval (secs.)
86400
Evaluate reference time
2200
Evaluate tolerance (secs.)
900
Save interval (secs.)
86400
Save reference time
2130
Save tolerance (secs.)
900

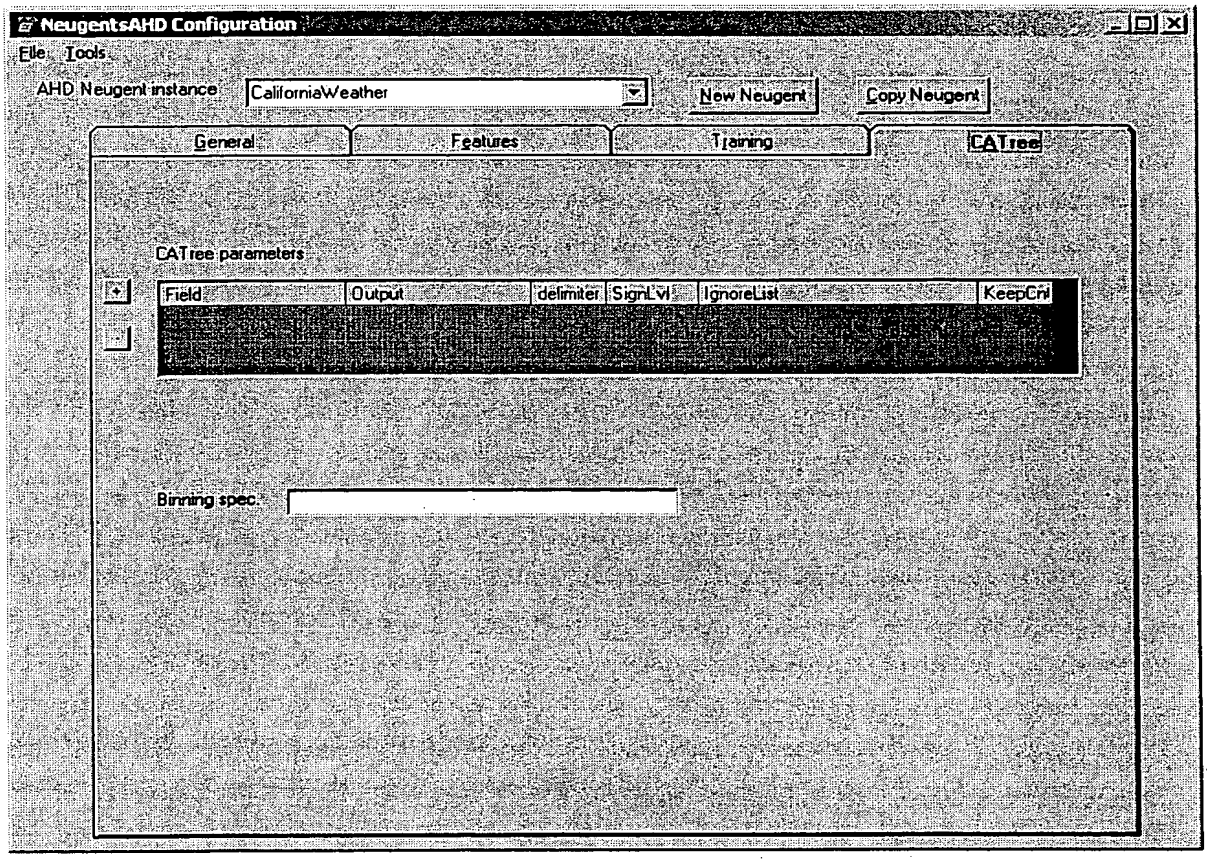
# FIG. 21


NeugentsAHD Configuration
File Tools
AHD Neugent instance
TestNeugent
New Neugent
Copy Neugent
General
Features
Training
CATree
Feature Specification
CallsOpened
New Feature Spec
Namespace
AHD_DB
Outputs only
Delete Feature Spec
Feature names
SQL Statement
callsopened:Dout
labelfield:String
select ("T" + $SYSTEM_TIME$) as LabelField, count(close_date) as CallsOpened from chg
where open_date > $SYSTEM_TIME$ - $PATTERN_INTERVAL$
Stored procedure
Closure Conditions
Stored procedure name
Stored Procedure result
close_date > $SYSTEM_TIME$ - $PATTERN_INTERVAL$
Stored Procedure script
Stored Procedure parameters
Param
Value
Is lookup
Local key
FeatureSpec doing lookup
Foreign key
Pre-processing specifications
Feature
Method
New Feature
Parameters
Test Query

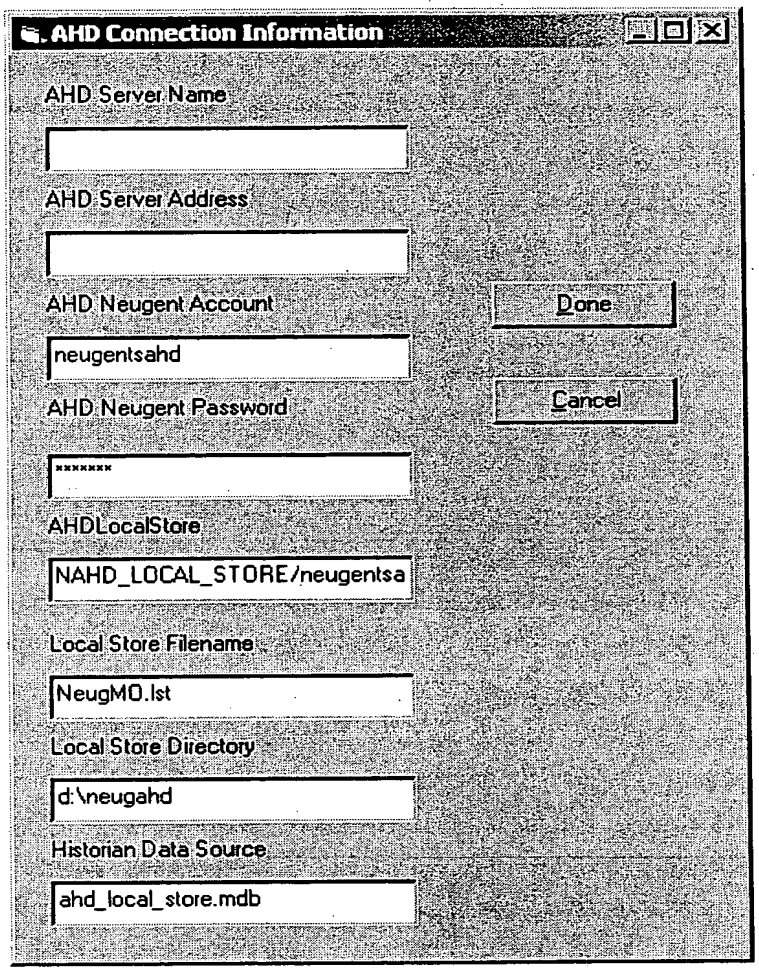
# FIG. 22


NeugentsAHD Configuration
File Tools
AHD Neugent instance: CaliforniaWeather
New Neugent
Copy Neugent
General
Features
Training
CATree
Pattern label: label
Group Key: region
Model inputs
Feature | Lag
temperature | 12
rainfall | 12
isnorthcoastdrainage | 0
iscentralcoastdrainage | 0
issanjoachindrainage | 0
Training pattern conditions
$time_stamp$ <= $system_time$ - (26 * $pattern_interval$)
Evaluation pattern conditions string
$TIME_STAMP$ > $SYSTEM_TIME$ - (26 * $PATTERN_INTERVAL$)
Model Outputs
Feature | Lead | MinAcc | Threshold | Low Limit | Hi Limit
temperature | 3 | 90. | | -40. | 140.
rainfall | 3 | 70. | | 0. | 50.
Event conditions
Field | Operator | Value
temperature | GT | 70
rainfall | LE | 0

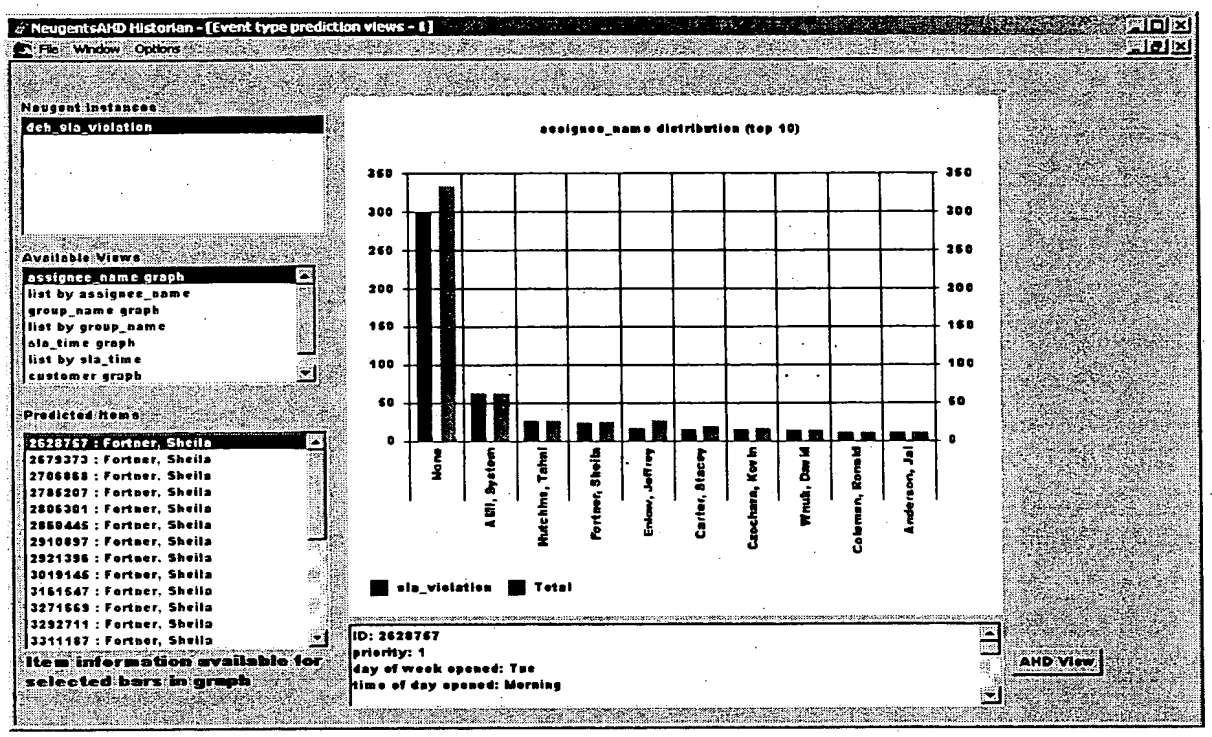
# FIG. 23


NeugentsAHD Configuration
File Tools
AHD Neugent instance
CaliforniaWeather
New Neugent
Copy Neugent
General
Features
Training
CATree
CATree parameters
Field
Output
delimiter
SignLvl
IgnoreList
KeepCnt
Binning spec.

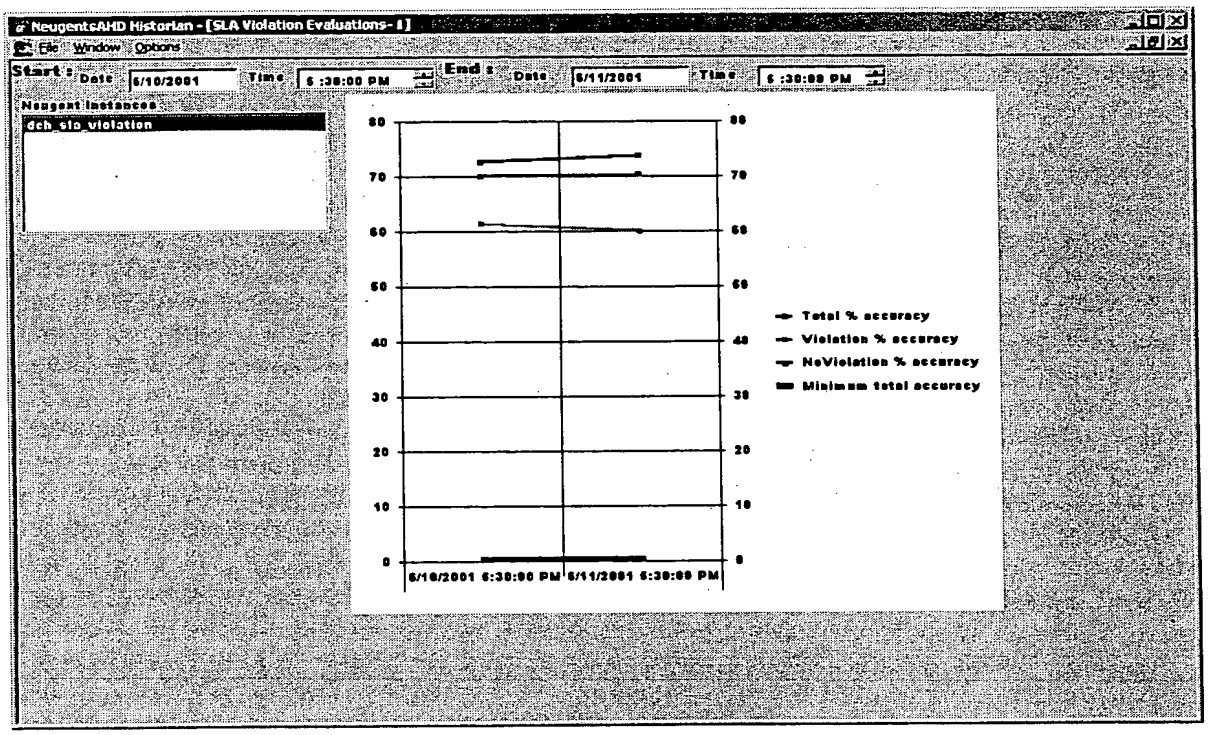
# FIG. 24


AHD Connection Information
AHD Server Name
AHD Server Address
AHD Neugent Account
neugentsahd
AHD Neugent Password
*******
AHDLocalStore
NAHD_LOCAL_STORE/neugentsa
Local Store Filename
NeugMO.lst
Local Store Directory
d:\neugahd
Historian Data Source
ahd_local_store.mdb
Done
Cancel

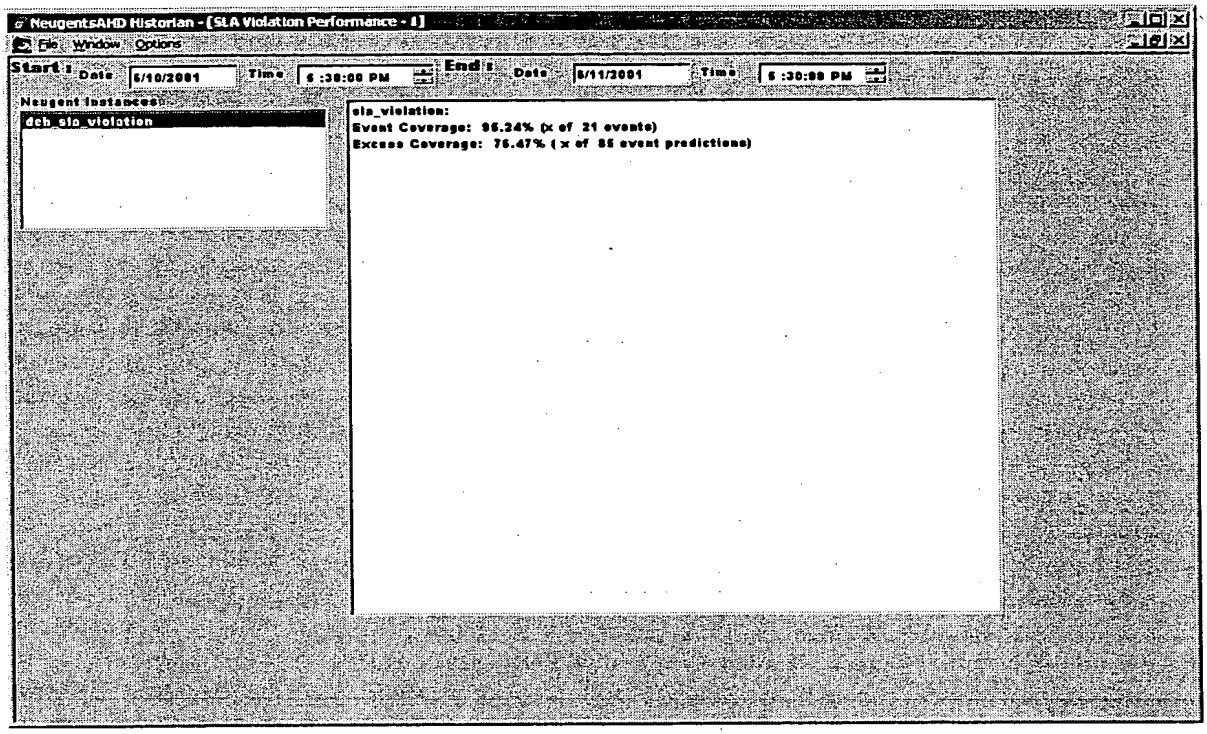
# FIG. 25


NeugentsAHD Historian - [Event type prediction views - 1]
File Window Options
Neugent instances
dch_sla_violation
Available Views
assignee_name graph
list by assignee_name
group_name graph
list by group_name
sla_time graph
list by sla_time
customer graph
Predicted Items
2628767 : Fortner, Sheila
2679373 : Fortner, Sheila
2706868 : Fortner, Sheila
2786207 : Fortner, Sheila
2806301 : Fortner, Sheila
2860445 : Fortner, Sheila
2910897 : Fortner, Sheila
2921396 : Fortner, Sheila
3019146 : Fortner, Sheila
3161647 : Fortner, Sheila
3271669 : Fortner, Sheila
3292711 : Fortner, Sheila
3311187 : Fortner, Sheila
Item information available for selected bars in graph
assignee_name distribution (top 10)
350
300
250
200
150
100
50
0
None
Allt, System
Hutchins, Tahni
Fortner, Sheila
Enlow, Jeffrey
Carter, Stacey
Czachara, Kevin
Wnuk, David
Coleman, Ronald
Anderson, Jai
sla_violation
Total
ID: 2628767
priority: 1
day of week opened: Tue
time of day opened: Morning
AHD View

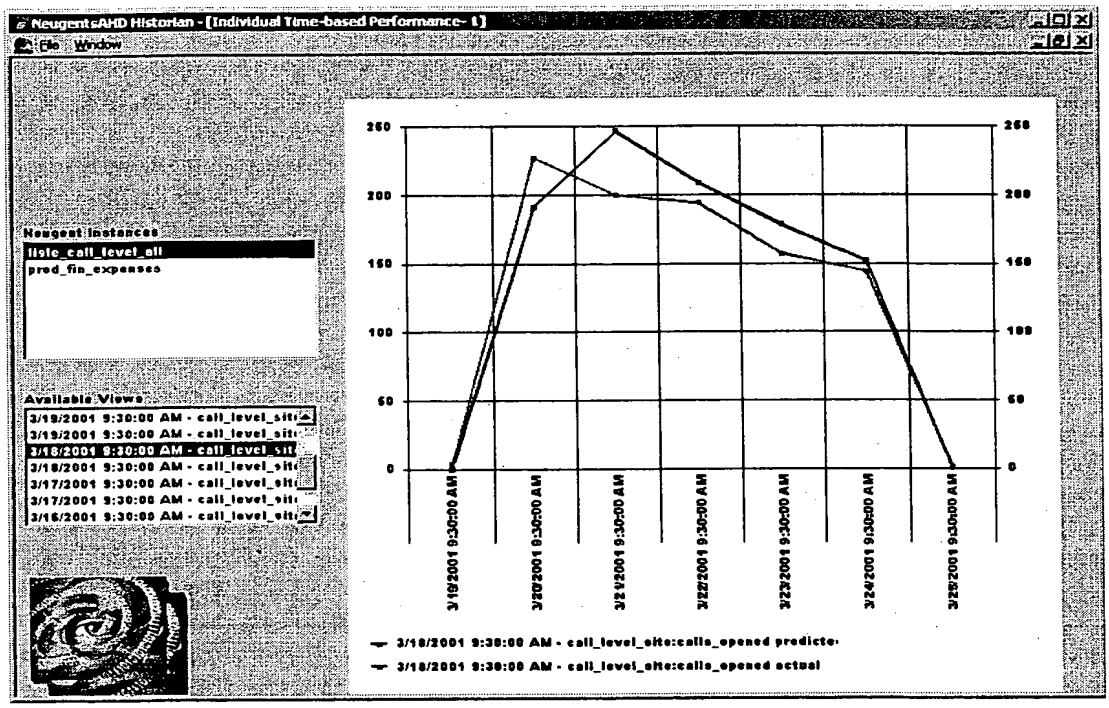
# FIG. 26


NeugentsAHD Historian - [SLA Violation Evaluations- 1]
File Window Options
Start : Date 6/10/2001 Time 5 :30:00 PM
End : Date 6/11/2001 Time 5 :30:00 PM
Neugent Instances
dch_sla_violation
80
70
60
50
40
30
20
10
0
6/10/2001 5:30:00 PM
6/11/2001 5:30:00 PM
Total % accuracy
Violation % accuracy
NoViolation % accuracy
Minimum total accuracy

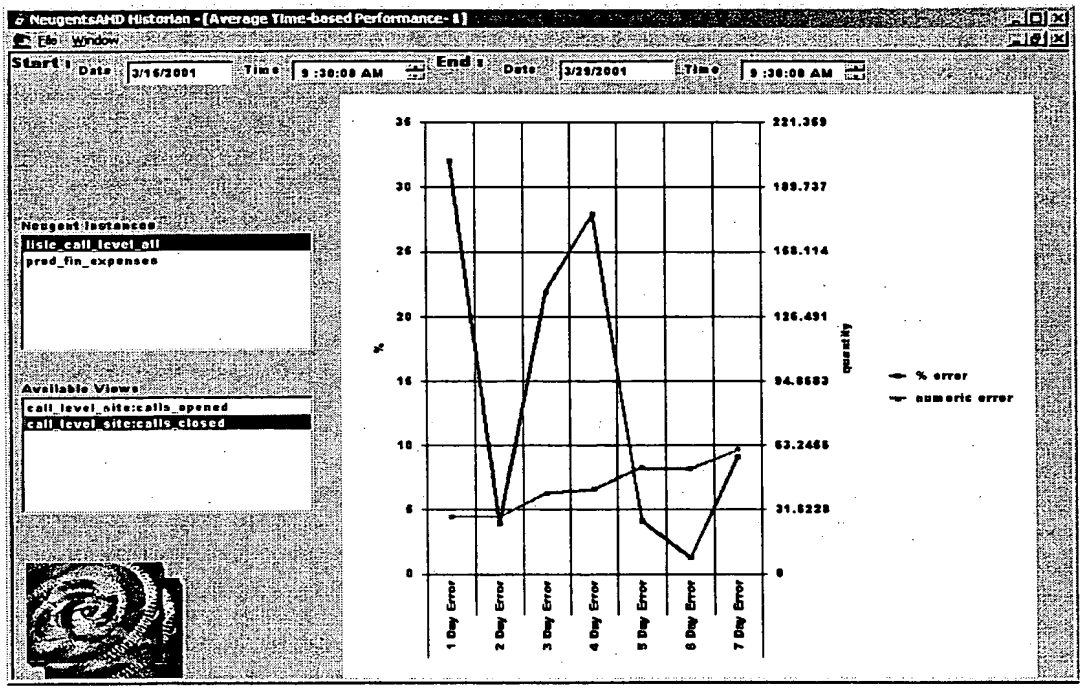
# FIG. 27


NeugentsAHD Historian - [SLA Violation Performance - 1]
File Window Options
Start : Date 6/10/2001 Time 5 :30:00 PM
End : Date 6/11/2001 Time 5 :30:00 PM
Neugent Instances:
deb_sla_violation
sla_violation:
Event Coverage: 95.24% (x of 21 events)
Excess Coverage: 76.47% ( x of 85 event predictions)

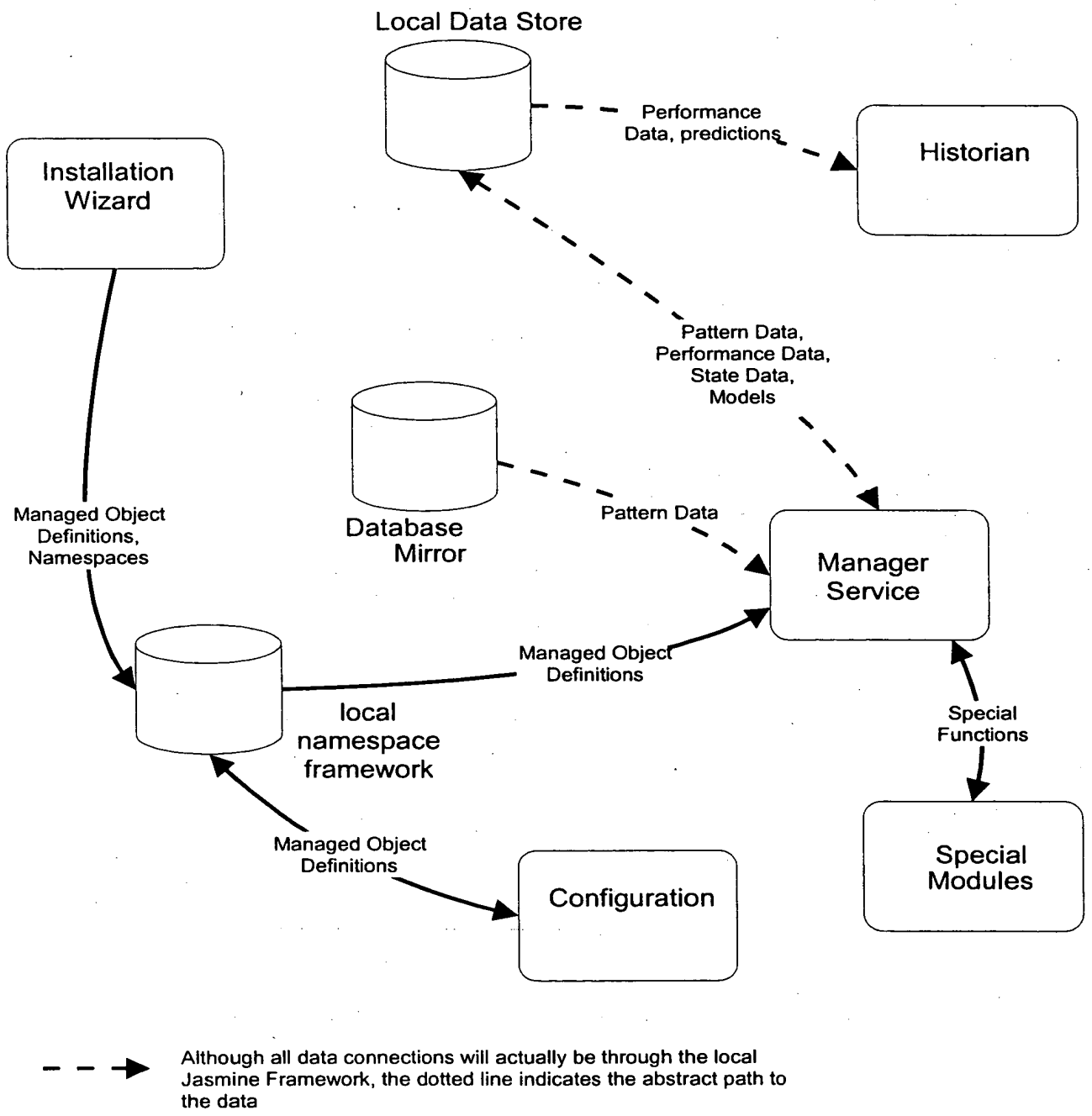
# FIG. 28


Neugent eAHD Historian - [Individual Time-based Performance- 1]
File Window
Neugent Instances
lisic_call_level_all
pred_fin_expenses
Available Views
3/19/2001 9:30:00 AM - call_level_site
3/19/2001 9:30:00 AM - call_level_site
3/18/2001 9:30:00 AM - call_level_site
3/18/2001 9:30:00 AM - call_level_site
3/17/2001 9:30:00 AM - call_level_site
3/17/2001 9:30:00 AM - call_level_site
3/16/2001 9:30:00 AM - call_level_site
250
200
150
100
50
0
3/18/2001 9:30:00 AM - call_level_site:calls_opened predicte
3/18/2001 9:30:00 AM - call_level_site:calls_opened actual

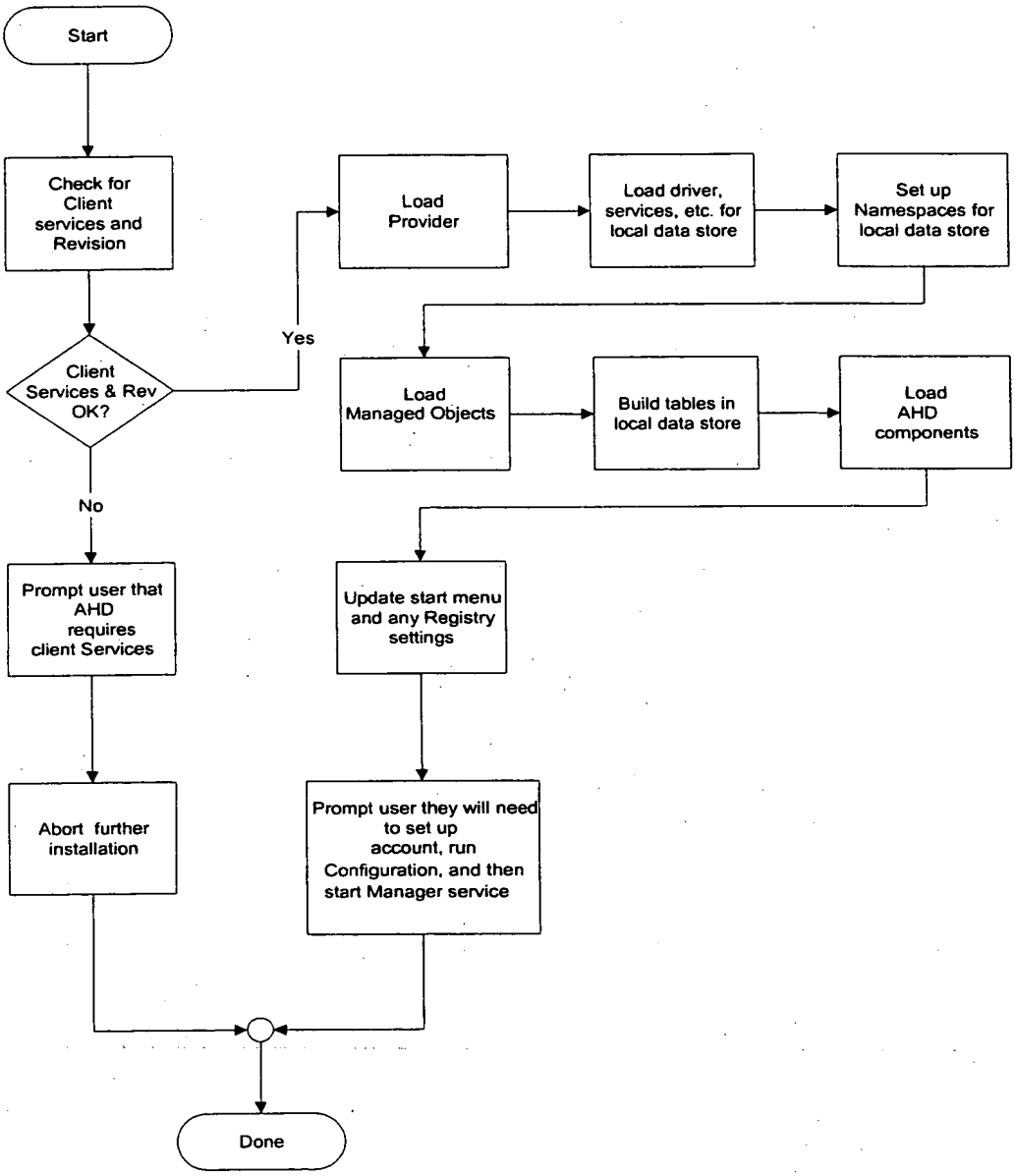
# FIG. 29


NeugentsAMD Historian - [Average Time-based Performance- 1]
File Window
Start : Date 3/16/2001 Time 9 :30:00 AM
End : Date 3/29/2001 Time 9 :30:00 AM
Neugent Instances
lisic_call_level_all
prod_fin_expenses
Available Views
call_level_site:calls_opened
call_level_site:calls_closed
%
quantity
36
30
26
20
16
10
6
0
221.369
189.737
158.114
126.491
94.8683
63.2455
31.6228
0
1 Day Error
2 Day Error
3 Day Error
4 Day Error
5 Day Error
6 Day Error
7 Day Error
% error
numeric error

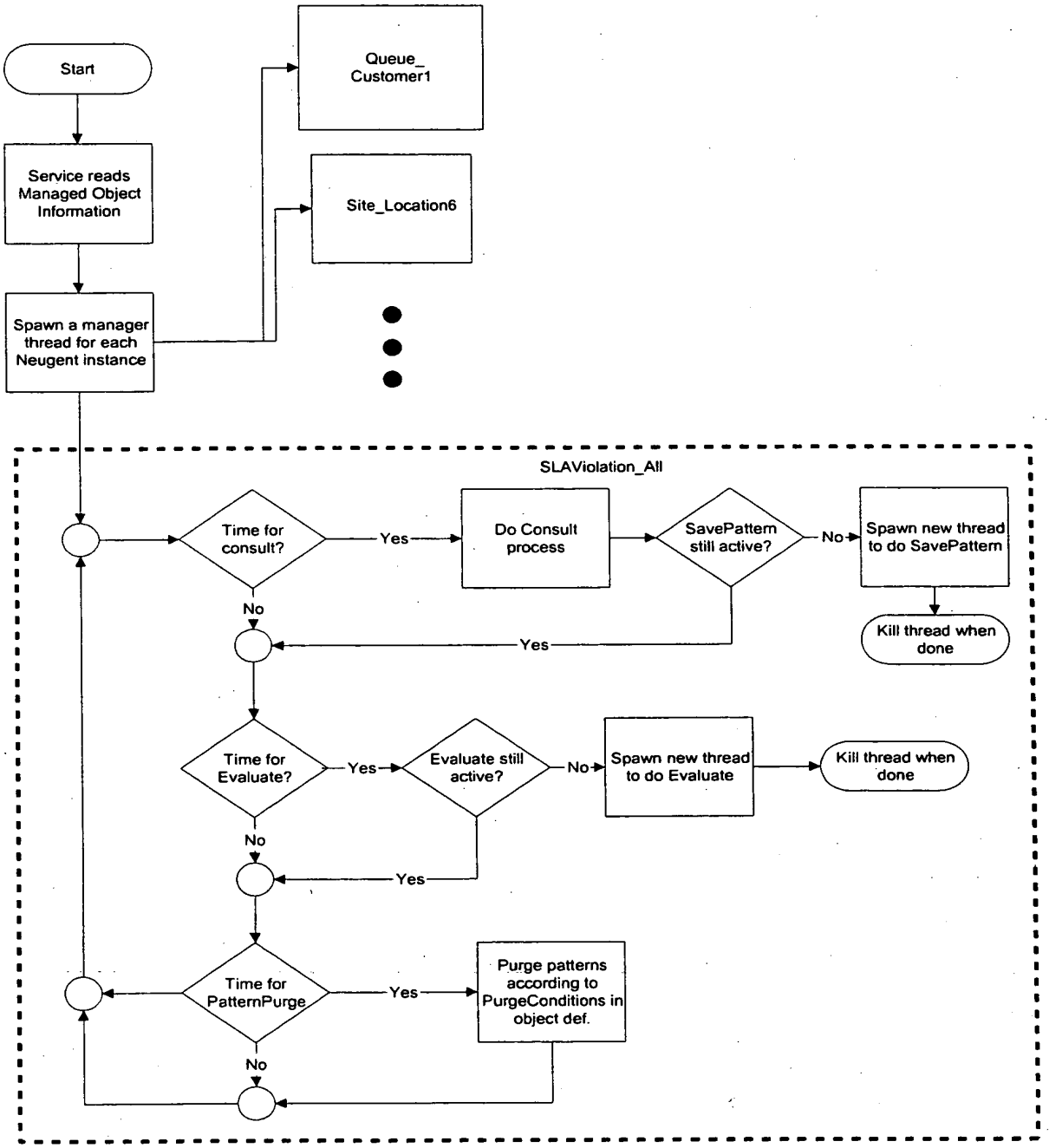
# FIG 30


Local Data Store
Performance Data, predictions
Historian
Installation Wizard
Pattern Data, Performance Data, State Data, Models
Database Mirror
Pattern Data
Manager Service
Managed Object Definitions, Namespaces
Managed Object Definitions
local namespace framework
Special Functions
Managed Object Definitions
Configuration
Special Modules
Although all data connections will actually be through the local Jasmine Framework, the dotted line indicates the abstract path to the data

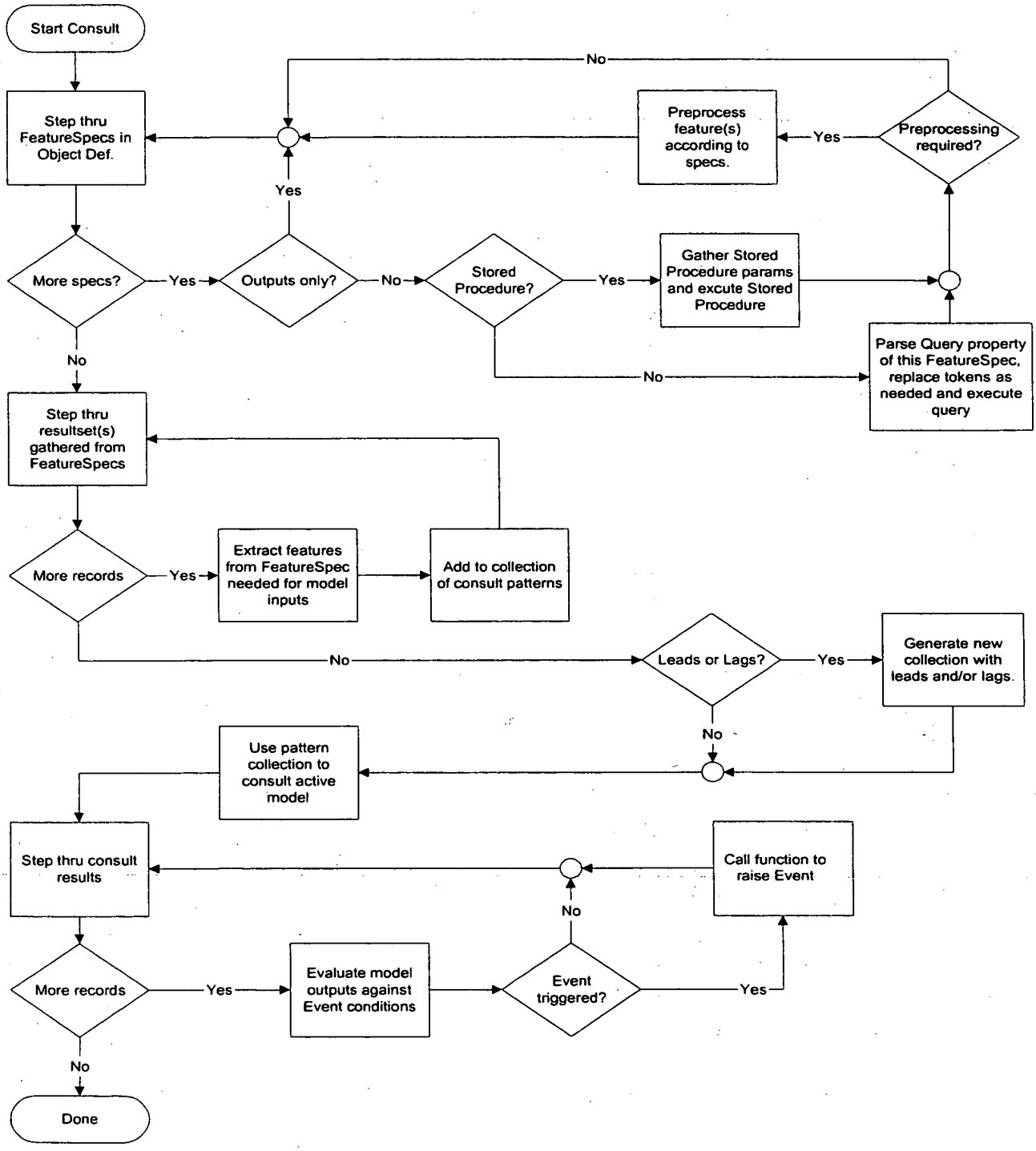
# FIG. 31


Start
Check for Client services and Revision
Client Services & Rev OK?
Yes
No
Load Provider
Load driver, services, etc. for local data store
Set up Namespaces for local data store
Load Managed Objects
Build tables in local data store
Load AHD components
Update start menu and any Registry settings
Prompt user that AHD requires client Services
Abort further installation
Prompt user they will need to set up account, run Configuration, and then start Manager service
Done

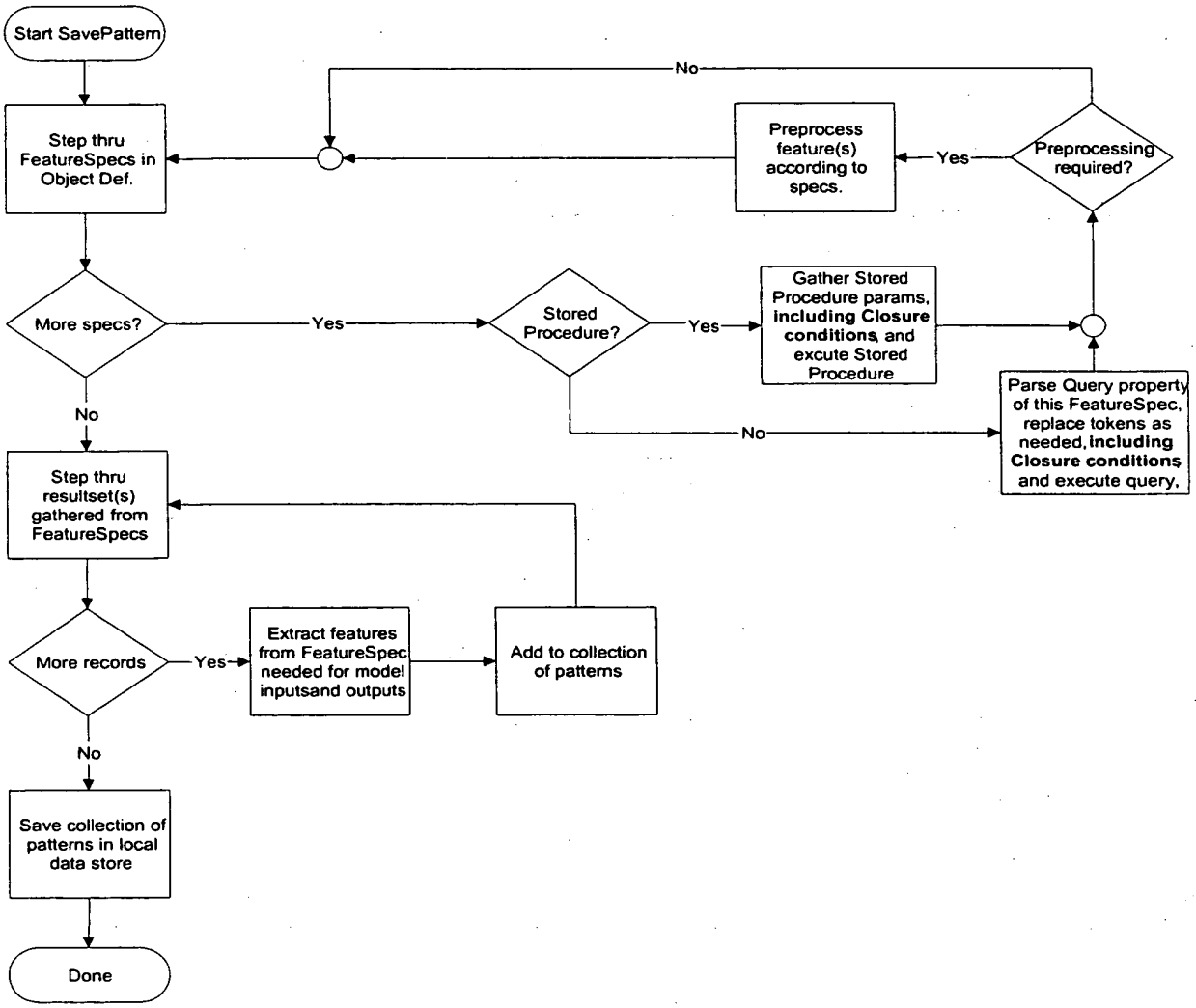
# FIG. 32


Start
Service reads Managed Object Information
Spawn a manager thread for each Neugent instance
Queue_ Customer1
Site_Location6
SLAViolation_All
Time for consult?
Yes
Do Consult process
SavePattern still active?
No
Spawn new thread to do SavePattern
Kill thread when done
No
Yes
Time for Evaluate?
Yes
Evaluate still active?
No
Spawn new thread to do Evaluate
Kill thread when done
No
Yes
Time for PatternPurge
Yes
Purge patterns according to PurgeConditions in object def.
No

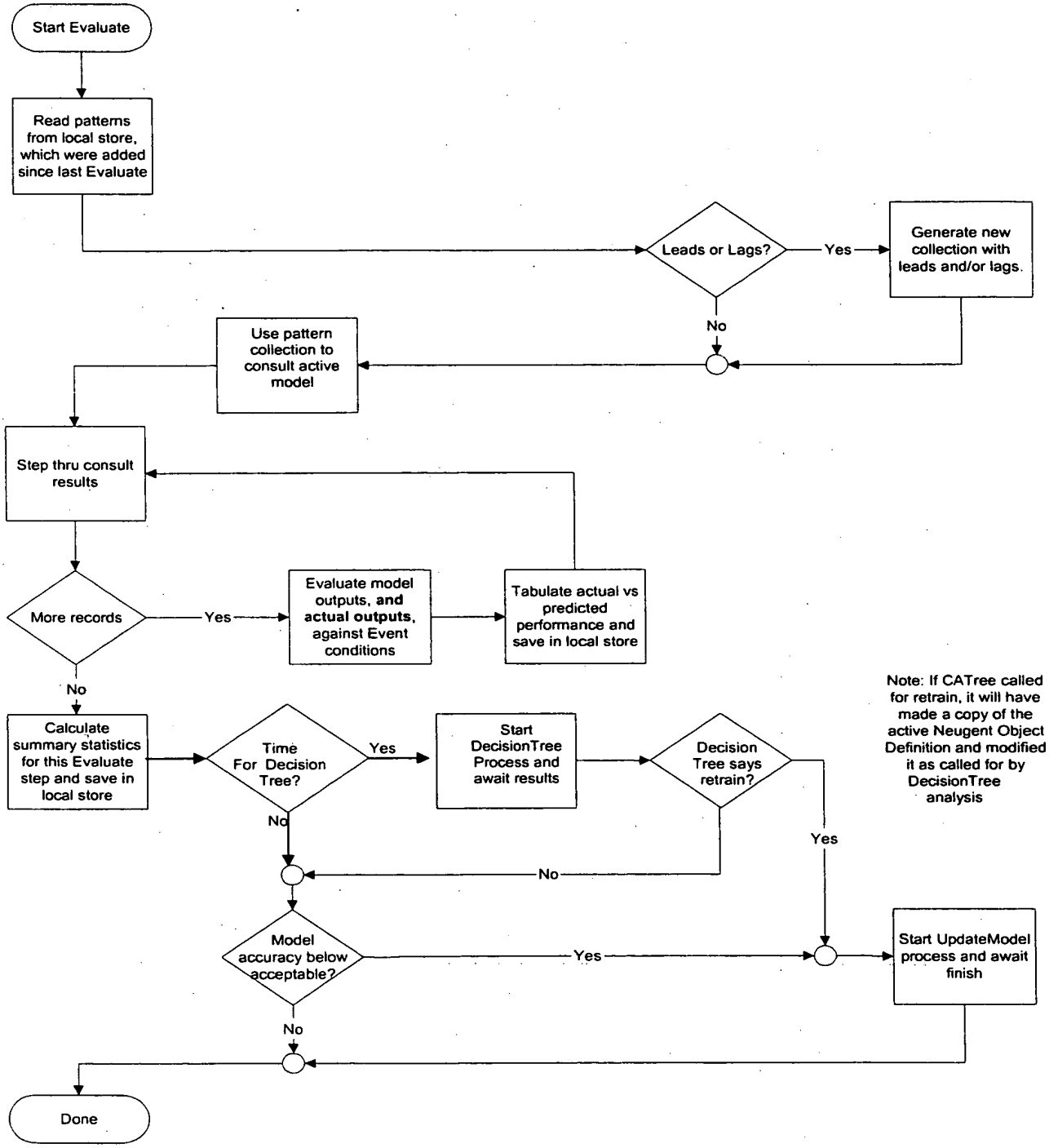
# FIG. 33


Start Consult
Step thru FeatureSpecs in Object Def.
Preprocess feature(s) according to specs.
Preprocessing required?
No
Yes
More specs?
Yes
Outputs only?
No
Yes
Stored Procedure?
Yes
Gather Stored Procedure params and excute Stored Procedure
No
Parse Query property of this FeatureSpec, replace tokens as needed and execute query
No
Step thru resultset(s) gathered from FeatureSpecs
More records
Yes
Extract features from FeatureSpec needed for model inputs
Add to collection of consult patterns
No
Leads or Lags?
Yes
Generate new collection with leads and/or lags.
No
Use pattern collection to consult active model
Step thru consult results
Call function to raise Event
No
More records
Yes
Evaluate model outputs against Event conditions
Event triggered?
Yes
No
Done

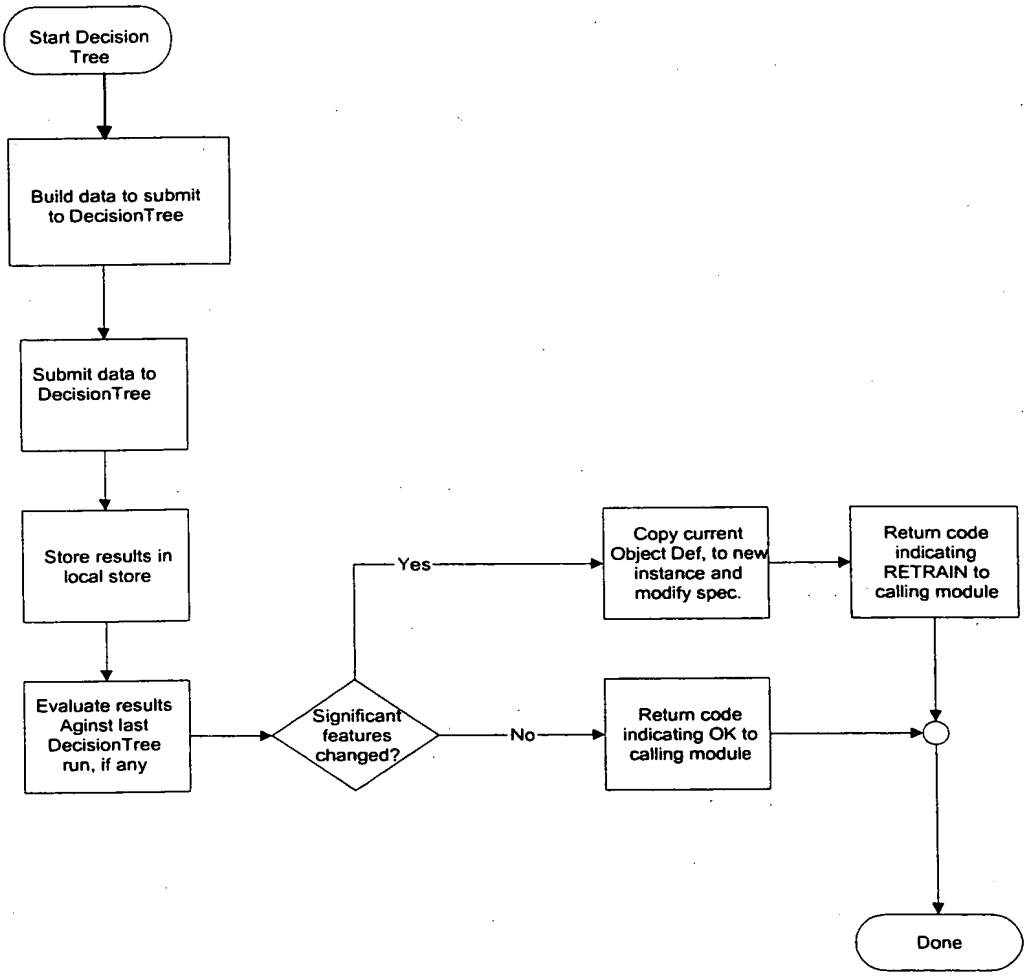
# FIG. 34


Start SavePattern
Step thru FeatureSpecs in Object Def.
More specs?
Yes
No
Stored Procedure?
Yes
No
Gather Stored Procedure params, including Closure conditions, and excute Stored Procedure
Preprocessing required?
Yes
No
Preprocess feature(s) according to specs.
Parse Query property of this FeatureSpec, replace tokens as needed, including Closure conditions and execute query.
Step thru resultset(s) gathered from FeatureSpecs
More records
Yes
No
Extract features from FeatureSpec needed for model inputsand outputs
Add to collection of patterns
Save collection of patterns in local data store
Done

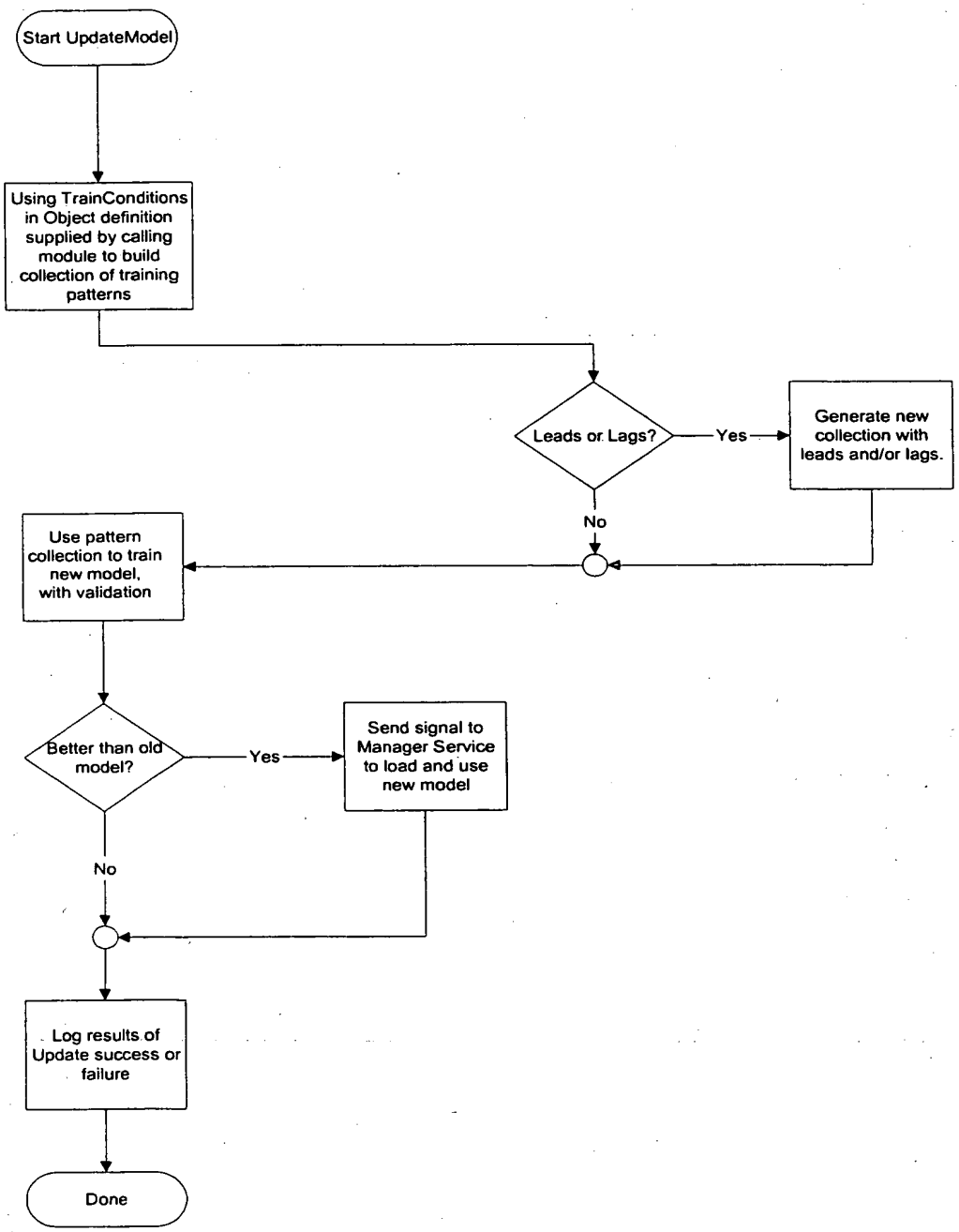
# FIG. 35


Start Evaluate
Read patterns from local store, which were added since last Evaluate
Leads or Lags?
Yes
Generate new collection with leads and/or lags.
No
Use pattern collection to consult active model
Step thru consult results
More records
Yes
Evaluate model outputs, and actual outputs, against Event conditions
Tabulate actual vs predicted performance and save in local store
No
Calculate summary statistics for this Evaluate step and save in local store
Time For Decision Tree?
Yes
Start DecisionTree Process and await results
Decision Tree says retrain?
Note: If CATree called for retrain, it will have made a copy of the active Neugent Object Definition and modified it as called for by DecisionTree analysis
No
Yes
No
Model accuracy below acceptable?
Yes
Start UpdateModel process and await finish
No
Done

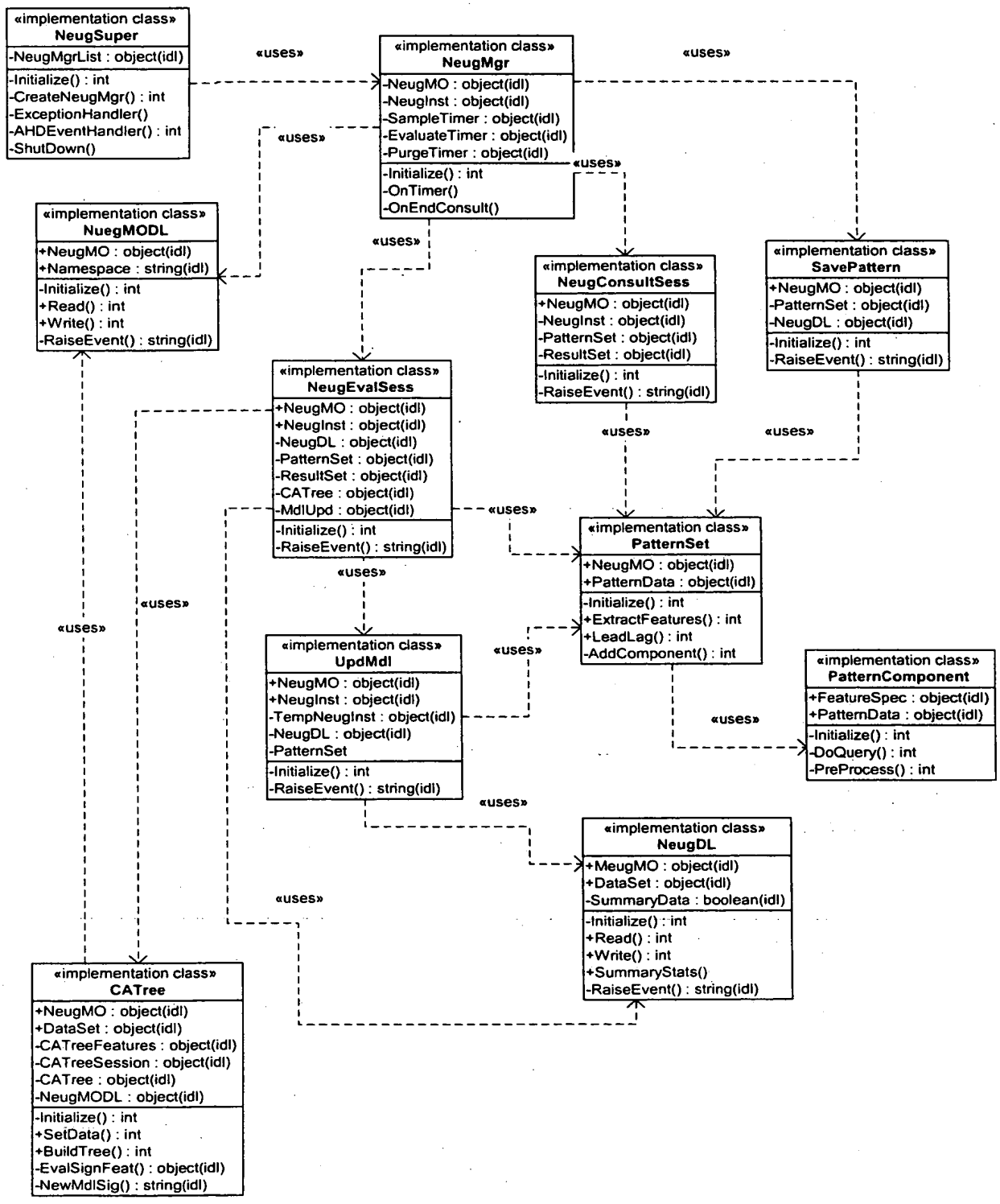
# FIG. 36


Start Decision Tree
Build data to submit to DecisionTree
Submit data to DecisionTree
Store results in local store
Evaluate results Aginst last DecisionTree run, if any
Significant features changed?
Yes
No
Copy current Object Def, to new instance and modify spec.
Return code indicating RETRAIN to calling module
Return code indicating OK to calling module
Done

# FIG. 37


Start UpdateModel
Using TrainConditions in Object definition supplied by calling module to build collection of training patterns
Leads or Lags?
Yes
Generate new collection with leads and/or lags.
No
Use pattern collection to train new model, with validation
Better than old model?
Yes
Send signal to Manager Service to load and use new model
No
Log results of Update success or failure
Done

# FIG. 38


«implementation class»
NeugSuper
-NeugMgrList : object(idl)
-Initialize() : int
-CreateNeugMgr() : int
-ExceptionHandler()
-AHDEventHandler() : int
-ShutDown()
«uses»
«implementation class»
NeugMgr
-NeugMO : object(idl)
-NeugInst : object(idl)
-SampleTimer : object(idl)
-EvaluateTimer : object(idl)
-PurgeTimer : object(idl)
-Initialize() : int
-OnTimer()
-OnEndConsult()
«implementation class»
NuegMODL
+NeugMO : object(idl)
+Namespace : string(idl)
-Initialize() : int
+Read() : int
+Write() : int
-RaiseEvent() : string(idl)
«implementation class»
NeugConsultSess
+NeugMO : object(idl)
-NeugInst : object(idl)
-PatternSet : object(idl)
-ResultSet : object(idl)
-Initialize() : int
-RaiseEvent() : string(idl)
«implementation class»
SavePattern
+NeugMO : object(idl)
-PatternSet : object(idl)
-NeugDL : object(idl)
-Initialize() : int
-RaiseEvent() : string(idl)
«implementation class»
NeugEvalSess
+NeugMO : object(idl)
+NeugInst : object(idl)
-NeugDL : object(idl)
-PatternSet : object(idl)
-ResultSet : object(idl)
-CATree : object(idl)
-MdlUpd : object(idl)
-Initialize() : int
-RaiseEvent() : string(idl)
«implementation class»
PatternSet
+NeugMO : object(idl)
+PatternData : object(idl)
-Initialize() : int
+ExtractFeatures() : int
+LeadLag() : int
-AddComponent() : int
«implementation class»
UpdMdl
+NeugMO : object(idl)
+NeugInst : object(idl)
-TempNeugInst : object(idl)
-NeugDL : object(idl)
-PatternSet
-Initialize() : int
-RaiseEvent() : string(idl)
«implementation class»
PatternComponent
+FeatureSpec : object(idl)
+PatternData : object(idl)
-Initialize() : int
-DoQuery() : int
-PreProcess() : int
«implementation class»
NeugDL
+MeugMO : object(idl)
+DataSet : object(idl)
-SummaryData : boolean(idl)
-Initialize() : int
+Read() : int
+Write() : int
+SummaryStats()
-RaiseEvent() : string(idl)
«implementation class»
CATree
+NeugMO : object(idl)
+DataSet : object(idl)
-CATreeFeatures : object(idl)
-CATreeSession : object(idl)
-CATree : object(idl)
-NeugMODL : object(idl)
-Initialize() : int
+SetData() : int
+BuildTree() : int
-EvalSignFeat() : object(idl)
-NewMdlSig() : string(idl)